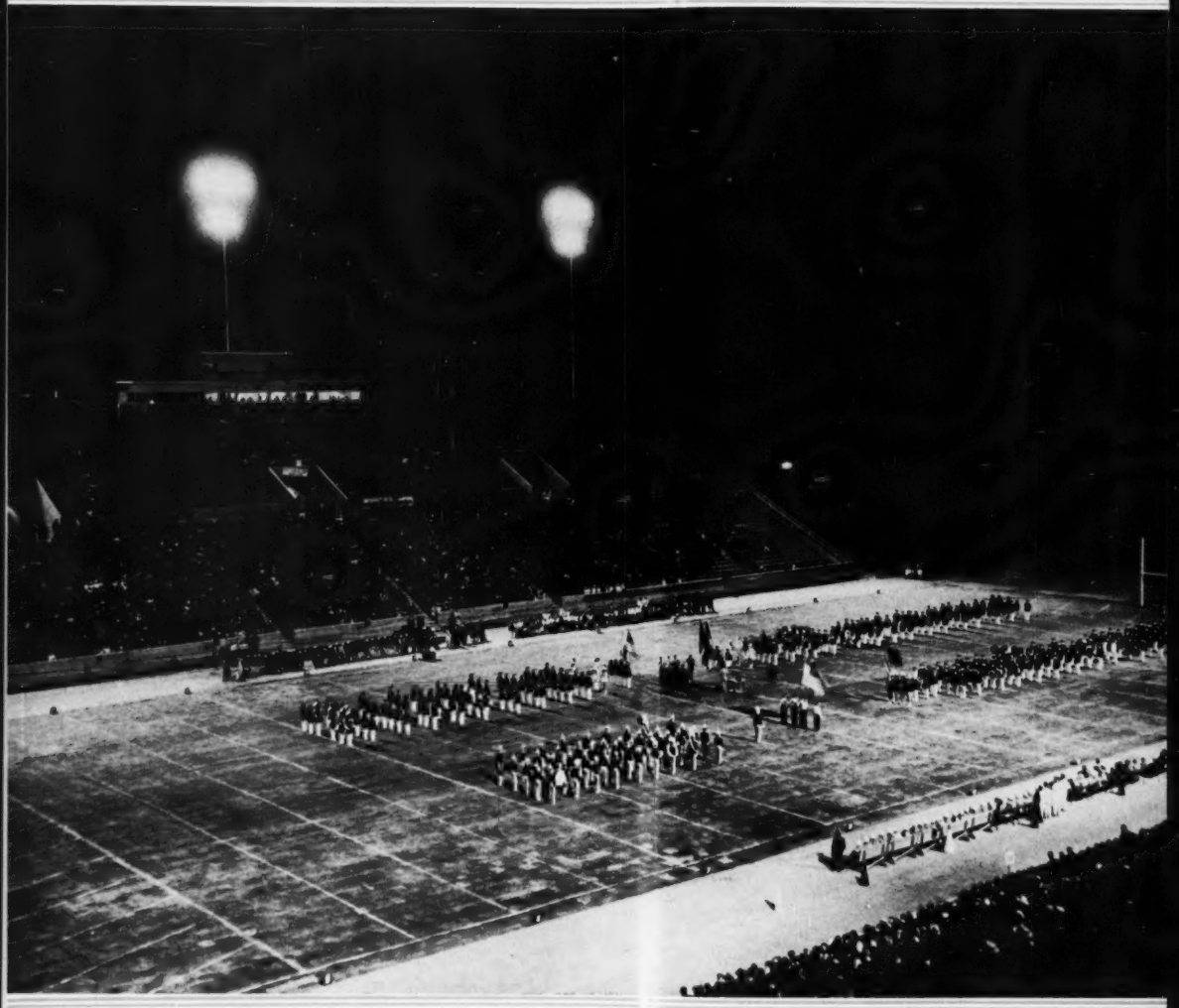
ELECTRICAL WEST

September 1951
25 Cents



Annual Lighting Issue

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

wish-full thinking!

Trends and fashions notwithstanding, the basic fundamentals of selling never change. The things which sell best are those which fulfill a want, need or desire. That is certainly true in the business of selling electrical appliances—and it's a primary consideration in the preparation of Edison electrical appliance advertising.

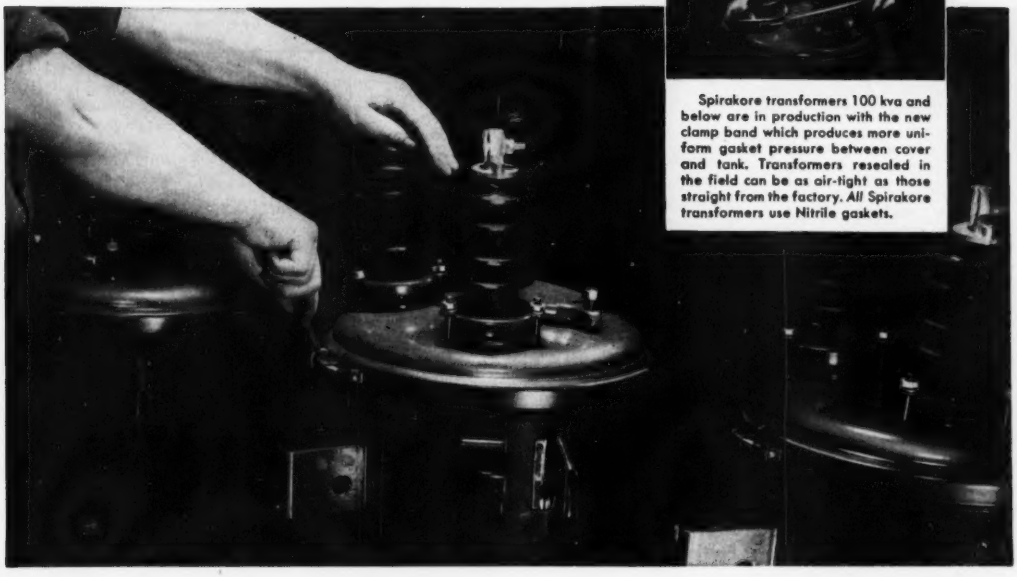
Take, for example, these Edison newspaper advertisements on electric home food freezers. They place the major emphasis on things any homemaker thinks of as highly desirable. Saying "Shop when you like," "Cook when you please" and "Free Meals" instead of "Home Food Freezers for Sale" gets the customers on your side right from the start.

Advertising which leads directly from customer wishes to dealer sales has been an Edison activity for over half a century.

SOUTHERN CALIFORNIA EDISON COMPANY

New cover band makes seal on G-E Spirakore* transformers even better

Spirakore transformers 100 kva and below are in production with the new clamp band which produces more uniform gasket pressure between cover and tank. Transformers resealed in the field can be as air-tight as those straight from the factory. *All* Spirakore transformers use Nitrile gaskets.

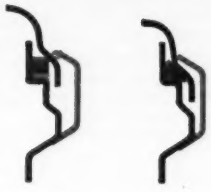


The cover on General Electric distribution transformers is now clamped against its Nitrile rubber gasket by a clamp band or ring. This produces uniform gasket pressure around the entire cover rim—results in even better sealing and resealing than ever before.

As in the past, breathing is completely stopped in G-E Spirakore transformers. Sealing is air-tight so that moisture-laden air can't be drawn into the tank to contaminate oil and shorten transformer life. Yet with this sealing, the new clamp actually improves accessibility. One bronze bolt holds the cover tightly in place. Loosen it, and band and cover lift right off. No adhesives to break—no surfaces to clean before resealing. You even re-use the same gasket.

Better sealing is only one of the reasons why Spirakore is the finest transformer you can buy. The full story is told in Bulletin GEA-5400. If you haven't a copy, write for one today. Address *General Electric Company, Schenectady 5, New York.*

*Registered trademark of the General Electric Company.



BEFORE TIGHTENING **AFTER TIGHTENING**

The brown represents the Nitrile rubber gasket which is of square cross section. The red is the new clamp band. When the band is tightened, the cover is drawn down against the gasket, compressing it and making an air-tight seal.

All openings—hand holes and bushings as well as cover—are sealed with Nitrile gaskets which are resistant to oil, age, sunlight and operating temperatures.

402-111

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

SEPTEMBER 1951

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S. The all-industry magazine of progress, established 1887, and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity." Contents copyright. Sixty-third year of publication

VOL. 107 NO. 3

ELECTRICAL WEST

George C. Tenney, Editor
W. A. Cyr, Associate Editor — Walter C. Heston, Engineering Editor
Peggy Boyer, Assistant Editor — John Coetz, Typography

Next Month

October is our special industrial issue. Theme this year will be Power for Industry. Adequacy of power supply is a vital question in this period of defense production. The nation looks to the West for major production in wood products, aluminum, copper, steel, aircraft and agricultural products.

How well the West is prepared to meet industrial power demands will be told in several sectional reviews on power reserves. The report from the Northwest will show a critical situation that could result in a 600,000-kw deficiency this fall and winter. In the Pacific Southwest and other regions there are comfortable reserves over loads.

There will be articles describing the new Contra Costa steam plant of PG and E, and the Gadsby steam plant of Utah Power & Light, as examples of what utilities are doing to maintain reserves.

Another article will deal with the contribution of the electric log carriage drive to sawmill operation. By way of regular material, a new utility service building will be described and there will be an article showing the problem of wiring a modern cantilever building requiring vertical conduit runs.

Look for the Contractors' and Sales News Letters for timely and up-to-the-minute tips and information.

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Cover: Spokane Memorial Stadium, for which Pettingill & Kelley of Portland engineered and Electric Smith, Spokane, installed 144 G-E floodlights on six 80-ft steel poles to deliver from 15 to 25 f-c on the playing field.

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Cleveland (5) ..... **Frank J. Seiler, 1510 Hanna Bldg.**
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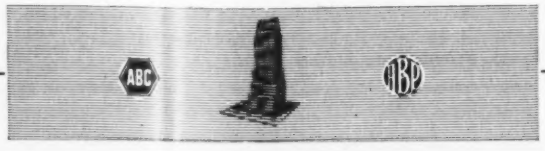
San Francisco (4) ..... **Tom Carmody, 68 Post St., DO. 2-4600**



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NEW KYLE 23 KV

Interrupting capacity 1500 amperes at 23 kv

150 kv basic impulse level

Cross-blast arc extinction

5 to 100 ampere ratings; rating rapidly and easily changed in the field

L-M's new KYLE type E recloser is specially designed for 23 kv service. The type E has exceptionally strong construction, with large contacts of finest arc-resisting material. The oil cross-blast feature insures very rapid extinction of the arc.

The recloser provides ample protection for circuits with loads up to 100 amperes and fault currents up to 1500 amperes. It is extremely accurate, with dependable hydraulic timing proved by years of field experience. In fact, well over half the reclosers in service today are Kyles! Type E's will coordinate with one another as well as with fuses on branch circuits.

The unit provides up to three successive reclosures plus final opening to lockout. Choice of three operating curves, seven operating sequences. Has all the Kyle safety features. Built-in coil protection. Radio noise-free. Meets applicable AIEE and NEMA standards or proposed standards, and is REA-accepted. Filled with ORTO®, L-M's inhibited oxidation-resistant transformer oil, for longer life.

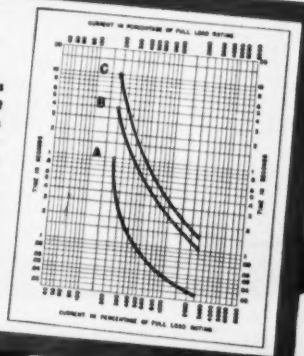
Get the Whole Story

Ask the L-M Field Engineer to tell you all about this new Kyle type E recloser; or write for copy of bulletin to Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

62

Choice of Seven Sequences

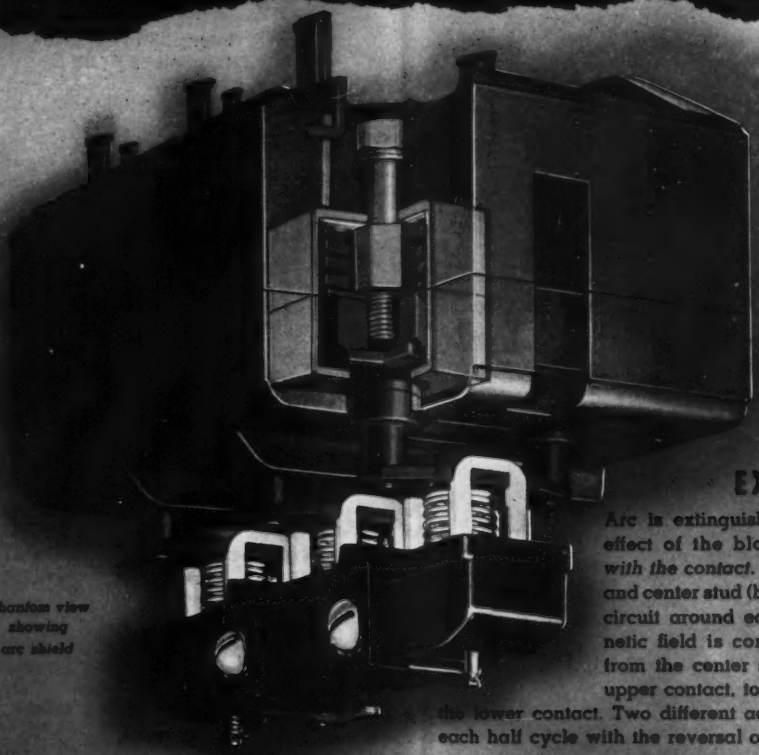
Kyles are the only reclosers offering choice of at least three time-current curves and seven tripping sequences. Curve A, fast; curve B, retarded; curve C, extra retarded. Sequences quickly and easily changed in the field by changing one or two small parts. No extra shop trips!



LM®

LINE MATERIAL

The All New CLARK "CY" TYPE AC MOTOR CONTROL



Phantom view showing arc shield

Here's how the ARC is EXTINGUISHED

Arc is extinguished by applying the effect of the blow-out coil *concentric with the contact.* The steel arc chamber and center stud (blue) form the magnetic circuit around each contact. The magnetic field is concentrated in a cone from the center stud that supports the upper contact, to steel rim surrounding the lower contact. Two different actions occur, changing each half cycle with the reversal of the current.

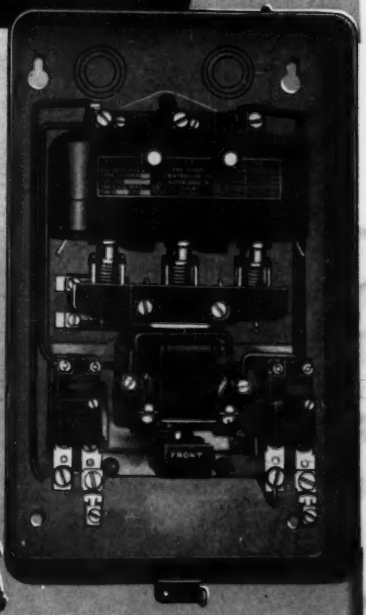
In one current direction the arc is forced to the outer edge of the upper contact, lengthened and rotated. In the other, the arc is rotated and forced to the middle of the upper contact. In each case, the magnetic field tends to quench the arc, either by lengthening it or confining it.

Constant forced rotation of the arc, moving continually from a hot to a cold spot, minimizes burning and pitting of contacts.

Let a CLARK application engineer show you what this BLUE RIBBON PRODUCT means to you in increased production and lower maintenance.

CLARK ENGINEERED ELECTRICAL CONTROL

— STARTER features an entirely new principle in ARC INTERRUPTION



Another CLARK First! In the Type "CY," CLARK offers, for the first time, a line of AC Motor starters that gives you the extra protection of "Mill-Type" heavy-duty construction and design. These new starters feature the combined use of strong multi-turn magnetic blow-outs and twin-break contacts* to achieve a new high in arc-interrupting efficiency.

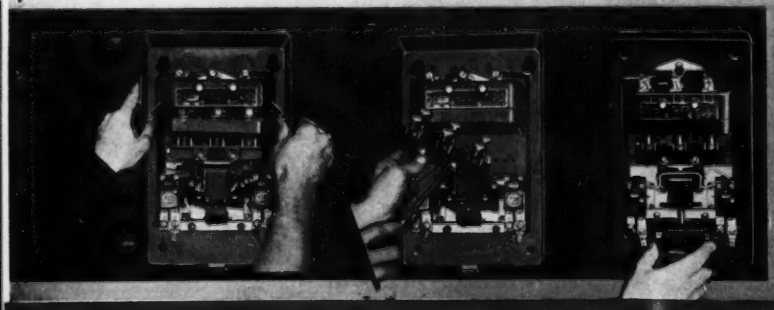
Other important advantages include:

- One piece upper arc shield, closed at the top, to prevent accumulation of hot gases between wiring terminals, minimizing phase-to-phase failures.
- Magnetic arc interrupters in steel arc chambers.
- Silver alloy double break contacts.
- Melting-alloy type overload relays.
- Vertical-lift clapper type magnet with straight line guided movement, using no springs.

*Magnetic blow-out coils are used on all Size 2 and 3 "CY" Starters. Sizes 0 and 1 use the same general Mill-Type construction as larger sizes.

The Maintenance Man's Dream

The new arc interrupting principle and twin-break silver-alloy contacts, assure longer contact life. No filing, dressing or cleaning of contacts is required. Inspection and maintenance are further simplified by design features.



- No tools needed to inspect contacts.
- Moving contacts easy to change.
- Stationary contacts quickly changed.
- Remove only two screws and one pin to change coils.
- All parts removable from the front.

THE CLARK CONTROLLER CO.

1146 EAST 152ND STREET · CLEVELAND 10, OHIO

The controls on all station-type feeder voltage regulators now meet rigid ASA Standards for Class I accuracy. This means they have an accuracy of at least 99%.

Induction Voltage Regulators require less maintenance

- No contacts in the main circuit
- No cams or springs or elaborate gear trains
- No mechanical brake to adjust, no separate braking circuit
- Nothing to lubricate—complete operating mechanism (including the motor) immersed in oil
- Even the oil lasts longer—because the tank is sealed to stop all breathing

And remember—G-E induction voltage regulators give accurate, stepless regulation of the highest quality obtainable. Rugged simplicity and the absence of time-delay makes them ideally suited for use on distribution circuits where loads are heavy, voltage variations are frequent, and prompt response to voltage change is essential.

Bulletin GEA-2985 gives full information. A copy can be secured from your G-E Apparatus Sales Office, or by writing *General Electric Company, Schenectady 5, N. Y.*

The General Electric IRS Induction Voltage Regulator has only three shafts, including that of the motor. All are mounted on enduring roller or ball bearings; all operate under oil. Wear is negligible. One gear train, a double-worm reduction, provides a drive that is simple, silent, self-locking and positive. There are no ratchets, no pawls, no chains to introduce uncertain operation and questionable life. No special braking circuits are used. The capacitor that gives the motor its high starting torque promptly throttles its rotation when the motor supply circuit is opened.

404-79

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

Now over 96,000 HOURS of trouble-free turbine lubrication with SHELL TURBO OIL

88,000 HOURS of trouble-free turbine lubrication

with SHELL TU... O...

And at last inspection the oil was still in "like new" condition... reports a well-known power company

THE ABOVE is not just ... panies, shipping ... turbines testify to ... from Shell Turbo Oil. ... ing costs.

Shell was first to ... turbine lubricant... properties it must h...

TYPICAL APPLICATIONS
Where Shell Turbo Oils Can Save on Long Term Lubrication Costs

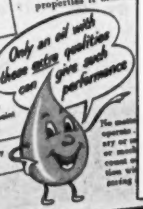
STEAM TURBINES—Direct connected, geared, pressure circulation, ring oiled

HYDRAULIC TURBINES—Vertical, horizontal, in governor systems, thrust and guide bearings.

HYDRAULIC SYSTEMS—In machine tools; hydraulic presses and other all-hydraulic power equipment.

BEARINGS—Plain and anti friction, where severe conditions or other factors point toward use of oxidation resistant oil.

Also recommended for some heavy duty or compressor lubrication



ONE YEAR AGO Shell published the advertisement at left. It reported a remarkable case history about Shell Turbo Oil: 88,000 hours of service in a power company turbine...trouble-free turbine lubrication the whole time...the oil itself still in like-new condition.

This year adds another chapter. Now—the same charge of Shell Turbo Oil has gone more than 96,000 hours. The company has enjoyed another year of trouble-free turbine lubrication. And the oil is STILL in like-new condition.

No matter what type of turbine you operate...steam or hydro, stationary or marine, in power generation or mechanical drive...you can count on long, trouble-free lubrication with Shell Turbo Oil. *Money-saving lubrication.*

SHELL

In 1934, off the New Jersey coast, fire raced wildly through the American steamship *Morro Castle,* claiming 134 lives in one of this country's greatest sea disasters. One of the ways by which the fire spread so rapidly through the ship was along the insulation on the wiring that covered the whole vessel like a network of nerves.

In those days, wax-finished, braided wires were in common use and were so dangerously inflammable that the wax-covered cotton servings or braids, if ignited, actually burned like a torch. Moreover, this wax-finished insulation was easily disintegrated by heat, light and moisture, a condition which further increased the fire hazard.

Obviously, something had to be done to prevent the spread of fires along wiring insulation—a need that was grimly proved by the *Morro Castle* catastrophe.

PIONEERING IS SIMPLY DOING THE OBVIOUS FIRST

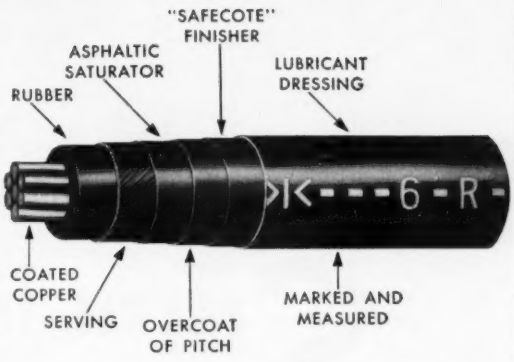
...and proved the need for

SAFECOTE WIRE

As early as 1928, National Electric began the experimental manufacture of a new and improved insulation, "Fire-Stop," that was later to be hailed as the "most important achievement in a decade." This new insulation was *flame retardant* as well as moisture resistant.

Pitch, rather than wax, overcoated the saturant and hermetically sealed the braids, servings and insulation against light, air, heat and moisture, to retard oxidation and disintegration. In time, this wire came to be marketed under the registered trade name "Safecote."

Fire-resistant wiring is only one of National Electric's many contributions toward better, safer, more convenient electrical installations. For more than 40 years, the National Electric name has stood for everything in wiring—the world's largest producer of the *complete line* of secondary electrical distribution systems.



Today, National Electric Building Wires, Power Cables, Varnished Cambric Cables, Service Entrance Cables and other important non-metallic covered conductors are "Safecote" protected against fire, water and other deterioration—a safeguard that has helped prevent the repetition of the *Morro Castle* tragedy. Colors are fixed and permanent. Fishing is easier. Wires and cables are marked and measured every two feet to assure ready, easy identification.

EVERYTHING IN WIRING POINTS TO

National Electric
PRODUCTS CORPORATION

SMITH Impulse Turbines

FOR HIGH HEADS, and wherever the head and water quantities available prohibit the use of reaction-type machines. Ideal for installations in remote localities because of the ease with which the completed unit may be transported. The simplicity of design, facility of operation and greater dependability remove the necessity of skilled operators and attendants. Smith's solid-cast runner design provides the additional advantages of closer spacing of buckets resulting in increased speed and consequently, a decrease in the size of the turbine unit, as well as the generator. Write for your copy of our Bulletin — "Impulse Turbines by SMITH!"

Impulse runner of *solid-cast* design, an exclusive SMITH advantage.

S. MORGAN SMITH COMPANY

YORK, PENNSYLVANIA

POWER by SMITH

Everyone concerned with specifying or providing ideal luminous-acoustical environments . . . should read this book
Wakefield CEILING

There never was a book like this because there never was a product like this. The Wakefield Ceiling is a completely integrated means of providing total luminous-acoustical environments, produced in accordance with your specifications at the Wakefield factory, shipped complete to the job and installed in its entirety by a Wakefield-licensed electrical contractor. To know about the Wakefield Ceiling you must read this book. A letter on your business stationery will bring you a copy, free of charge. Write to *The F. W. Wakefield Brass Company, Vermilion, Ohio.*

Wakefield Over-ALL Lighting

RECOMMENDED COMBINATION
For Lighting Heavy-Industry Plants

No. 693-AL-HS

HIGH BAY LIGHTING

HIBAY* lighting applies to mounting heights exceeding 25 feet and finds its primary use in Mills, Shops, Hangars, etc. Equipment is designed for 500, 750, 1000 and 1500 Watt Incandescent lamps as well as for the newer type 400 and 1000 Watt Mercury lamps. The prismatic reflectors give highest efficiency, and their smooth inner surfaces prevent permanent depreciation. Heavy-duty rugged construction guarantees safe, trouble-free operation.

LOW BAY LIGHTING

LOBAY* lighting with its variety of light distributions—concentrating, intensive and extensive—features prismatic reflectors for all kinds of light manufacturing. Designed with and without aluminum covers, these reflectors use Incandescent and Mercury lamps. The wide selection of light patterns produces highest illumination for any arrangement of machinery or equipment.

No. 645-AL

OUTDOOR LIGHTING

REFRACTOLENS* units, applicable for many outdoor uses, can be flushed in the wall or mounted on the surface. Their compound REFRACTOLENS, smooth on the inside surface with the prismatic optics sealed in an airtight chamber, give 180° lateral spread. Designed for Incandescent (100-1000 watt) and the 400 E-H1 Mercury, high illumination level is provided over large areas requiring wide spread of light.

No. U-850

Based on the economical operation of mercury in combination with incandescent lamps or mercury alone with incandescent stand-by, Holophane has developed HIBAY, LOBAY, and Outdoor Lighting Equipment designed for the severe conditions typical of steel mills and other heavy-industry plants. Twin and triple units are also available.

Holophane

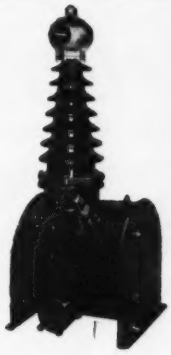
*Reg. U. S. Pat. Off.

HOLOPHANE COMPANY, INC.

Lighting Authorities Since 1898 • 342 MADISON AVENUE, NEW YORK 17, N.Y.

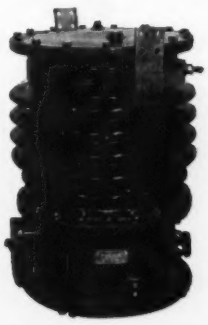
THE HOLOPHANE COMPANY, LTD., THE QUEENSWAY, TORONTO 14, ONTARIO

1. The type KO instrument transformer combines versatility in mounting with accuracy on heavy duty metering or relaying applications. It mounts in any position, horizontally or vertically, on poles or platforms. Tank is of all-welded construction. Transformer is vacuum-pressure compound filled to eliminate voids. Ratings: up to 15 kv — 10 to 800 amperes.



2. The newly designed type SPW potential transformer will handle accurate metering or relaying service even with the heavy operating burdens of sectionalizing switching requirements. Strength is exceptionally high. Tank is hermetically sealed. New design is very compact . . . solves the space limitation problem. Ratings: 24, 34.5, 46 and 69 kv voltage class.

3. Because the type PWD potential transformer is compound filled and the case completely welded and hermetically sealed, there is no changing or testing of liquids necessary. Transformer is free from breathing. Proper construction and design achieve high dielectric strength and high accuracy performance on all standard secondary burdens. Ratings: 240 to 14,400 primary voltage.



4. The porcelain clad type CJ outdoor oil-filled current transformer is of the wound type. It is designed for precise metering and has liberal current capacity with windings of high mechanical strength. Primary leads are brought out to blade type terminals through the porcelain bushing. Manufactured in all standard current ratings for operation on line voltages of 25 kv through 69 kv.

ALLIS-CHALMERS
INSTRUMENT
TRANSFORMERS

Profit 3 Ways with 400 RATINGS

AMONG THE MORE than 400 ratings of Allis-Chalmers instrument transformers, there's one that will fit your design needs. That's why you can save time and money, too, by standardizing on A-C instrument transformers. In every type you'll find the right combination of the best in engineering and materials. Whether your need is for instrument transformers or metering outfits you will profit three ways when you call on the Allis-Chalmers source of supply. You get (1) top quality, (2) prompt shipment and (3) wide selection.

Allis-Chalmers
Milwaukee 1, Wis.

Please send new 32 page bulletin 6187168 listing types, ratings, applications and prices of Allis-Chalmers instrument transformers.

Name .....

Title .....

Firm .....

Address .....

City ..... State .....

A-3448

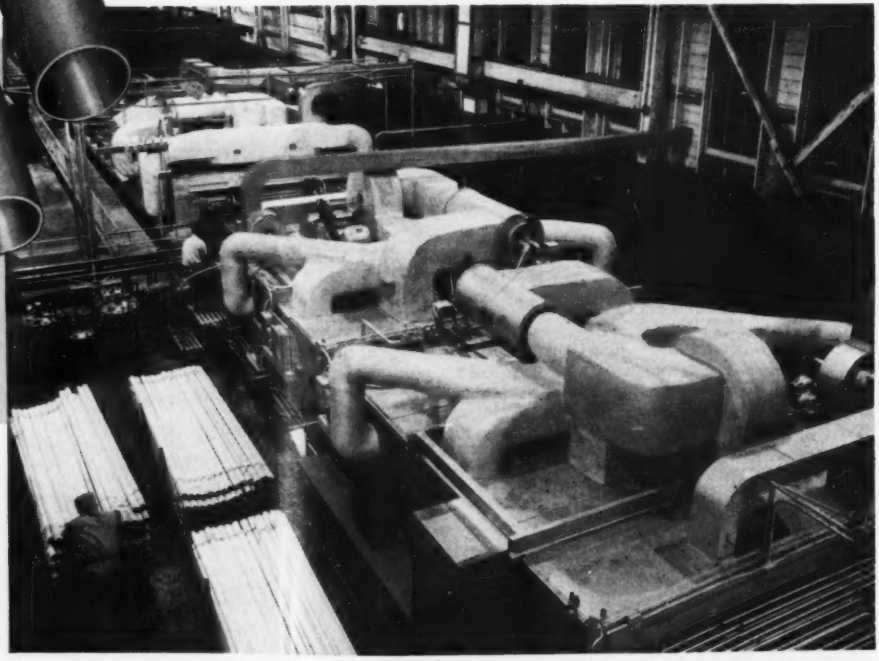
ALLIS-CHALMERS

PIONEERS IN POWER AND ELECTRICAL EQUIPMENT FROM GENERATION THROUGH UTILIZATION

In The West It's

ROME • EMT 90° Elbows

Available
in conveniently
packaged sizes of
¾", 1", 1¼", 1½" and 2".



Rome • EMT

THE *BETTER* ELECTRICAL METALLIC TUBING

Light in weight, easy to bend, economical to use . . . It is the preferred EMT in the West

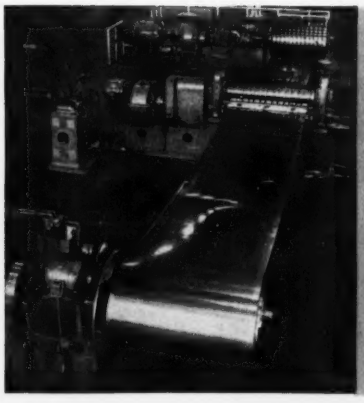
Made in the West to serve the West, ROME • EMT has a reputation for uniformly *high quality and easy workability*. In its Torrance, California plant, Rome Cable has spared no expense in making ROME • EMT a *superior* product. Manufactured on automatic equipment of latest design (see photographs below), ROME • EMT is uniform in weight, gauge and finish. Countless users now acclaim it as the *preferred* electrical metallic tubing.

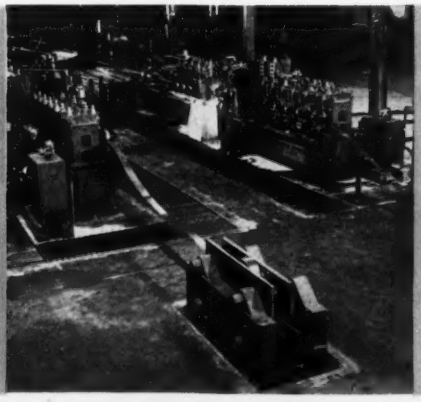
For exposed or concealed wiring, ROME • EMT hits a new high for safe and long-lived rigid steel raceway installation. Its interior is mirror-smooth . . . "clean as a shotgun barrel" users say . . . while the exterior is uniformly coated with corrosion and abrasion resistant zinc by electro-galvanizing.

Try ROME • EMT and be convinced. It takes the hard work out of conduit installation . . . it saves time . . . *it saves money.*

Approved by Underwriters' Laboratories, Inc. and available in ½", ¾", 1", 1¼", 1½" and 2".

It Costs Less to Buy the Best





WAREHOUSE STOCKS CARRIED AT

Torrance, Calif.
Los Angeles, Calif.
San Francisco, Calif.
Seattle, Wash.
Salt Lake City, Utah
Denver, Colo.
Dallas, Texas
Chicago, Ill.

- *Left:* Discharge end of electro-galvanizing and enameling unit
- *Above:* Equipment for slitting steel to accurate width from jumbo roll
- *Above Right:* Of advanced design, these units form and automatically weld the tubing

ROME CABLE
Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

ROME CABLE ROME, N.Y.

WESTERN SALES OFFICES AND WAREHOUSES

SALT LAKE CITY 1, UTAH
230 South 4th West St.

LOS ANGELES 21, CALIF.
2038 Bay Street

SAN FRANCISCO 24, CALIF.
1100 Selby Street

SEATTLE 4, WASH.
3404 Fourth Ave., So.

DENVER 3, COLO.
1160 Elati St.

SYLVANIA Light Bulbs mean BRIGHTER BUSINESS because:

In response to dealers' requests, Sylvania 4-Packs are pre-price-marked with suggested retail prices on the cartons . . . on the sleeves . . . on the bulbs.

1. New Popular Premium Offer: All-Aluminum HANDY-TONGS

Only **25¢** with the outside of a Sylvania 4-Pack

2. National Advertising *plus* Big Weekly TV Show

Big space advertising in *Look*, *McCall's*, *Good Housekeeping*, *Better Living*, and *Everywoman's Magazine* will tell millions about the Handy-Tongs offer. This premium will also be demonstrated on the nationwide TV show "Beat the Clock."

3. FREE Bright, Appealing Store Displays

Colorful window streamers and counter cards are furnished *free* to all your dealers. Eye-catching ad mats for local newspapers are also offered free of charge.

Alert all your dealers NOW!

Be sure to tell all your dealers about the important advertising efforts being placed behind Sylvania Light Bulbs this fall. Remember, with Sylvania they get finest products . . . finest premiums . . . fastest PROFITS. So stock extra Sylvania bulbs, Mr. Jobber, and get your full share of the brighter business ahead! For full details address: Sylvania Electric Products Inc., Dept. L-7509, 111 Sutter St., San Francisco 4, Calif.

SYLVANIA ELECTRIC PRODUCTS INC. 1901–1951 FIFTY YEARS OF PROGRESS 50th ANNIVERSARY

SYLVANIA

LIGHT BULBS; FLUORESCENT TUBES, FIXTURES, SIGN TUBING, WIRING DEVICES; RADIO TUBES; TELEVISION PICTURE TUBES; ELECTRONIC PRODUCTS; ELECTRONIC TEST EQUIPMENT; PHOTOLAMPS; TELEVISION SETS

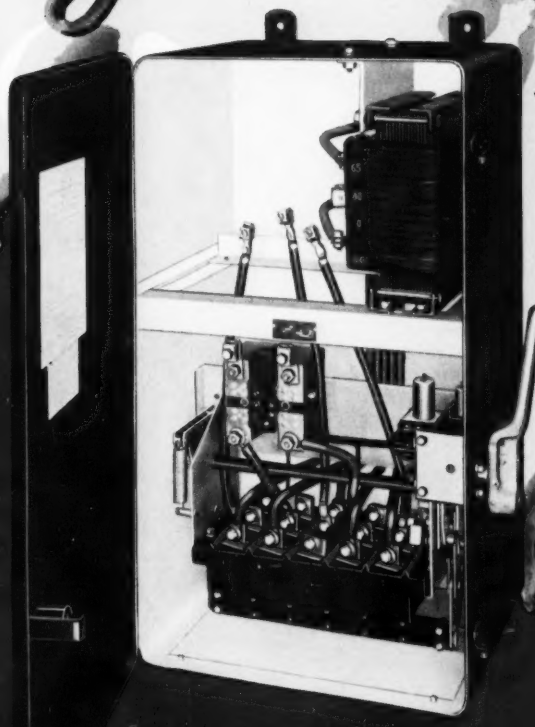
Avoid messy oil

Specify

Bulletin 646
Manual Transformer Type
REDUCED VOLTAGE STARTERS
with
air break contacts

Never before has a manually operated auto-transformer-type starter been available in such high ratings with air break contacts. Starters rated up to 75 hp, 220 volts; 150 hp, 440-550-600 volts have air break silver alloy contacts that require no cleaning, filing, or dressing. This eliminates contact maintenance . . . results in longer contact life . . . avoids dirty, messy jobs. Only the Size D starter —rated up to 125 hp, 220 volts; 250 hp, 440-550-600 volts—requires oil immersed, copper to copper contacts. Write for Bulletin 646.

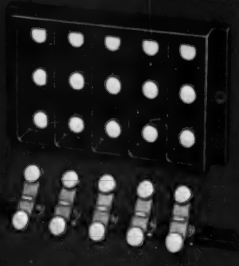
Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wis.



✓ Longer Contact Life

✓ Less Maintenance

✓ Double break, silver alloy contacts



Close-up of various air break contact blocks and separable contacts.

ALLEN-BRADLEY
QUALITY

A-B Quality

Where special conditions must be considered, the standard Bulletin 646 starter can be supplied with an oil tank.

most acclaimed manual starter on the market!

BULLETIN 609

Bulletin 609 hand operated starters are the recognized standard for starting and stopping small a-c motors in these maximum ratings:

Single phase—1½ hp, 110 volts; 3 hp, 220 volts.

Polyphase—5 hp, 220 volts; 7½ hp, 440-550 volts.

Ideal for industrial applications where remote push button control stations and no-voltage release are not required.

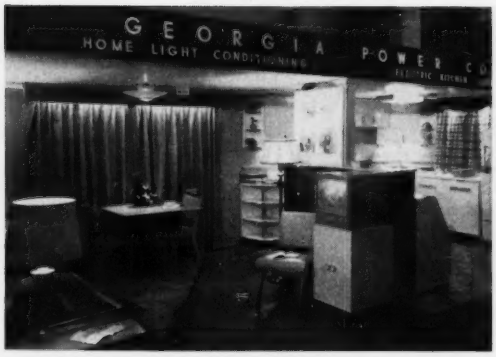
- **No Contact Maintenance**—The large double break, silver alloy contacts never need cleaning, filing, or dressing.
- **Quick Make and Break**—A simple toggle opens and closes the contacts with a snap action, preventing contact burning.
- **Push Button Operation**—Convenient "Start" and "Stop" buttons make the Bulletin 609 so easy to operate.
- **Reliable Overload Protection**—Two manually reset breakers protect the motor at all times from sustained overloads.
- **Small Size**—In spite of high current interrupting capacity, Bulletin 609 manual starters are small in size.
- **Easy to Install**—Lots of wiring room, terminals accessible from front, and knockouts on all sides of cabinet.
- **Bonderized Enclosure**—Bulletin 609 starters have pressed steel enclosures, bonderized to prevent corrosion.
- **Trouble Free Service**—Millions of these starters in operation testify to their satisfactory performance.

Allen-Bradley Co., 1316 S. Second Street, Milwaukee 4, Wis.

ALLEN-BRADLEY QUALITY MOTOR CONTROL

A-B Quality

4 examples: G-E Light Conditioning program now underway in a BIG way!



FEATURED AT HOME BUILDERS' SHOW. Most of the 40,000 people at this year's Atlanta exhibition saw the Georgia Power Company's Light Conditioning demonstration . . . one of the show's outstanding attractions.

SEEN BY THOUSANDS OF CLEVELANDERS. This home, one of 8 sponsored by the Cleveland Electric Illuminating Company, stayed open day and night; attracted thousands of home buyers interested in Light Conditioning.

ATTRACTED MORE THAN 12,000 VISITORS. People in the Metropolitan New York area flocked to see this Light Conditioned house in Closter, N. J. Recipes used included valance lighting in living room and dining room.

PRODUCED REQUESTS FOR 5000 RECIPE BOOKLETS. After seeing Boston Edison's model Light Conditioned living room, guests of the New England Home Show requested over 5000 Light Conditioning booklets.

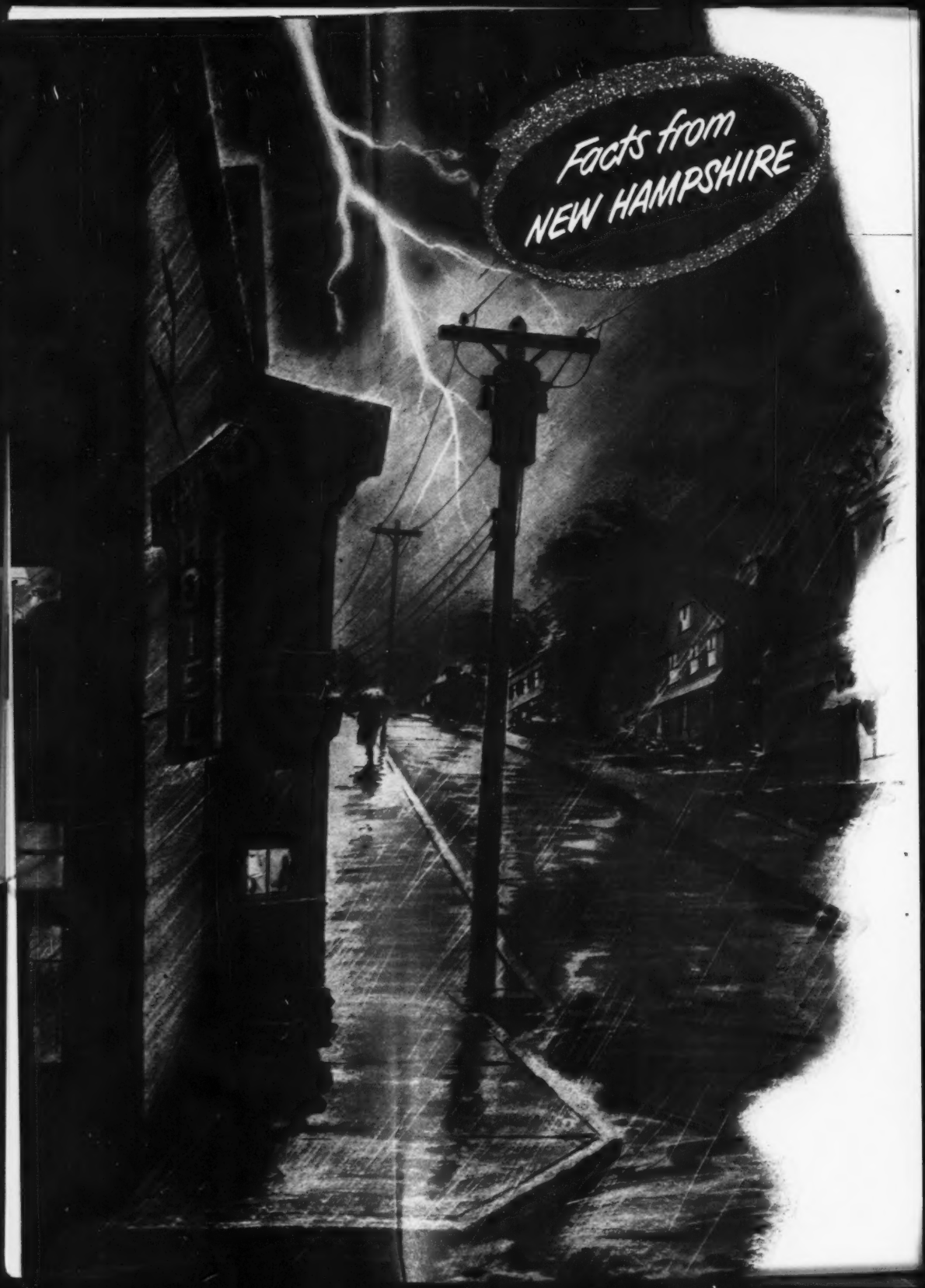
ALMOST 100 electric service companies have already begun to tie in with General Electric's Home Light-Conditioning Program. More and more lighting equipment suppliers are promoting Light-Conditioning.

Nearly 2 million Light-Conditioning recipe booklets have been distributed. And millions of people have been seeing and reading General Electric's national advertising on Light-Conditioning.

Shown above are four typical examples of how the Light-Conditioning Program is being carried on. To learn how you can tie in, call your G-E Lamp District Office, or write Lamp Division, General Electric, Dept. 166-EW-9, Nela Park, Cleveland 12, Ohio.

You can put your confidence in—

GENERAL ELECTRIC


Facts from
NEW HAMPSHIRE

"8 Outages a month cut to zero with 'CSP' Transformer"

"Until three years ago, we were having considerable transformer trouble due to lightning. 'CSP' Transformers proved to be our solution," reports a New Hampshire Utility.

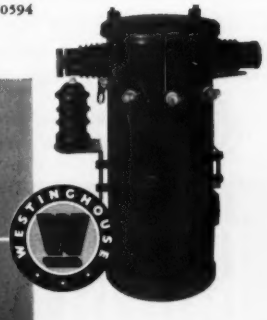
"One particularly troublesome 2,400-volt conventional transformer required re-fusing about twice a week during the lightning season. We tried interconnecting it, fused it for 10 amperes, and improved the ground with two extra No. 2 copper ground rods. Outages continued. One time the lightning arresters were actually blown up. We installed a 'CSP' Transformer, without any change in the existing ground, and no outages have been experienced since."

Installation and maintenance costs for "CSP" (Completely Self-Protecting) Transformers are always lower, because complete protective equipment is built in, not separately mounted. A two-year survey of Electric Light and Power Companies shows the following:

NATIONAL AVERAGES

	"CSP"	Conventional
Installation Costs	$13.87	$24.74
Burn-out Rate	0.257%	1.005%
Fuse Outages	None	5.64% (at $6.52 per outage)
Load Checks	Automatic	12.8%
Breaker Reset	1.02%	None

If you'd like to check your own costs against these national averages, ask your Westinghouse representative for Booklet B-4247-B, "Transformer Costs and Their Relation to Profits". Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70594



YOU CAN BE SURE... IF IT'S

Westinghouse

"CSP" DISTRIBUTION TRANSFORMERS

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver.

You can't buy Better Fittings or ones that cost less to use

Cross Section Showing Indentations.

Quicker to use and neater in appearance, Briegel All-Steel Indenter Fittings not only make stronger connections but also make each job more profitable to the contractor and satisfactory to his customers.

Two Easy Squeezes and they're set to stay. It is only natural that the Briegel All-Steel Indenter Fittings are the most widely used E.M.T. connectors and couplings. Contractors the world over recognize their cost cutting qualities and the fact that they make each wiring job neater, stronger and better.

All B-M Fittings Carry the Underwriters Seal of Approval

BRIEGEL METHOD TOOL CO.

GALVA, • ILLINOIS

DISTRIBUTED BY

The M. B. Austin Co., Northbrook, Ill.; Clayton Mark & Co., Evanston, Ill.; Wagner Malleable Products Co., Decatur, Ill.; Clifton Conduit Co., Jersey City, N. J.; General Electric Co., Bridgeport, Conn.; The Steelduct Co., Youngstown, Ohio; Enameled Metals, Pittsburgh, Penn.; Kondu Mfg. Co. Ltd., Preston, Ont.

Most for your money!

FOR MAXIMUM SPEED of installation... topmost maintenance economy... operational ease, safety and efficiency... the Federal Noark Bus Duct system is today's best buy.

To begin with, the unique Noark adjustable sliding drop hanger permits the most convenient location of supporting rods and provides the quickest method for installing bus duct that was ever devised. And from then on you get all the advantages brought by Federal Noark Bus Duct special features:

Interlocking Four-Channel Steel Housing . . . welded and screwed together to assure greatest strength. Even the longest runs are bound to be straight and true.

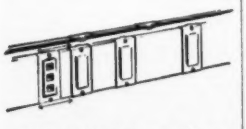
Extra Rugged Interior Construction... with the bus bars rigidly held by porcelain insulated receptacles every twelve inches. The bus bars are designed to withstand heavy fault currents.

Positive Contact . . . bus bars are silvered over their entire length. Plug-in stabs reinforced with heavy steel springs.

Insulated Plug-in Openings... no bus is exposed... operator is safe when changing plug-in device. For extra protection, new hook-on bars support plug-in device during installation.

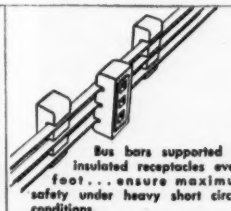
Unsurpassed Heat Dissipation . . . staggering of insulators on alternate sides of duct provides continuous air passage and coolest operation.

Federal Noark Bus Duct is factory-assembled in 10-foot sections, and completely flexible for future needs. For the full story, write Federal Electric Products Company, 50 Paris, Street, Newark 5, New Jersey.



Sliding, self-locking cover plates, protecting insulated plug-in openings, safeguard electricians.

Adjustable Sliding Drop Hangers automatically slide to position for exact alignment . . . slash installation time.



Bus bars supported by insulated receptacles every foot . . . ensure maximum safety under heavy short circuit conditions.

Interlocking four-channel construction assures greatest strength . . . even long runs are straight as a plumb line.

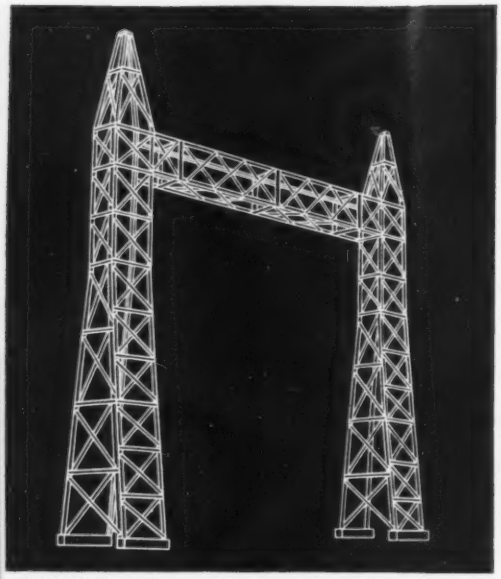
FEDERAL NOARK

Complete line of Federal Electric Products includes Motor Controls, Safety Switches, Service Equipment, Circuit Breakers, Panelboards, Switchboards, Control Centers, Bus Duct ★ Sales offices in principal cities.

Now.. G-E Outdoor Stations

with Standardized Structures

Available in voltage ratings from 7.5 to 230 kv

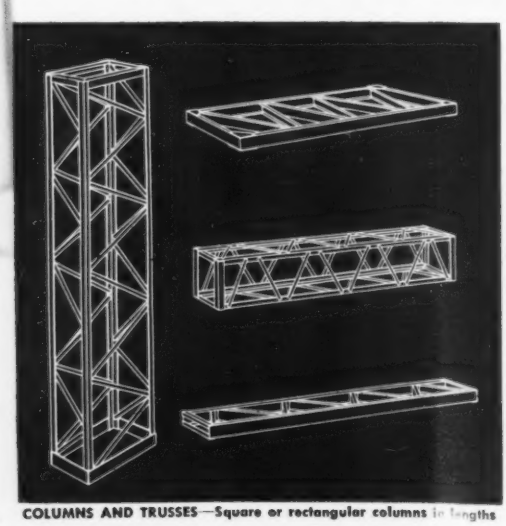


HIGH TOWER—Used for dead-ending incoming lines as well as support for incoming line disconnects. Lower truss supplied when required for support of oil circuit breaker isolating switches. Tower can be used singly or combined to make multi-bay arrangements.

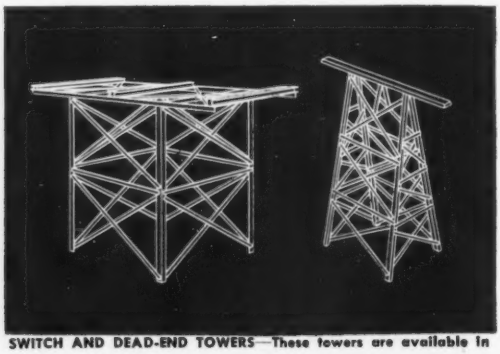
Designed as a result of 35 years of experience in outdoor station construction, G-E standardized steel structures now mean lower installed costs, less time required for station layout and engineering.

The typical components shown on this page can be combined to form an infinite variety of station arrangements. The design of all the electrical and structural items in an outdoor station must be co-ordinated mechanically and electrically if the items are to form a satisfactory installation. Sensible standardization of structural steelwork now makes it all the more practical to order it as one pre-designed component along with the other station equipment.

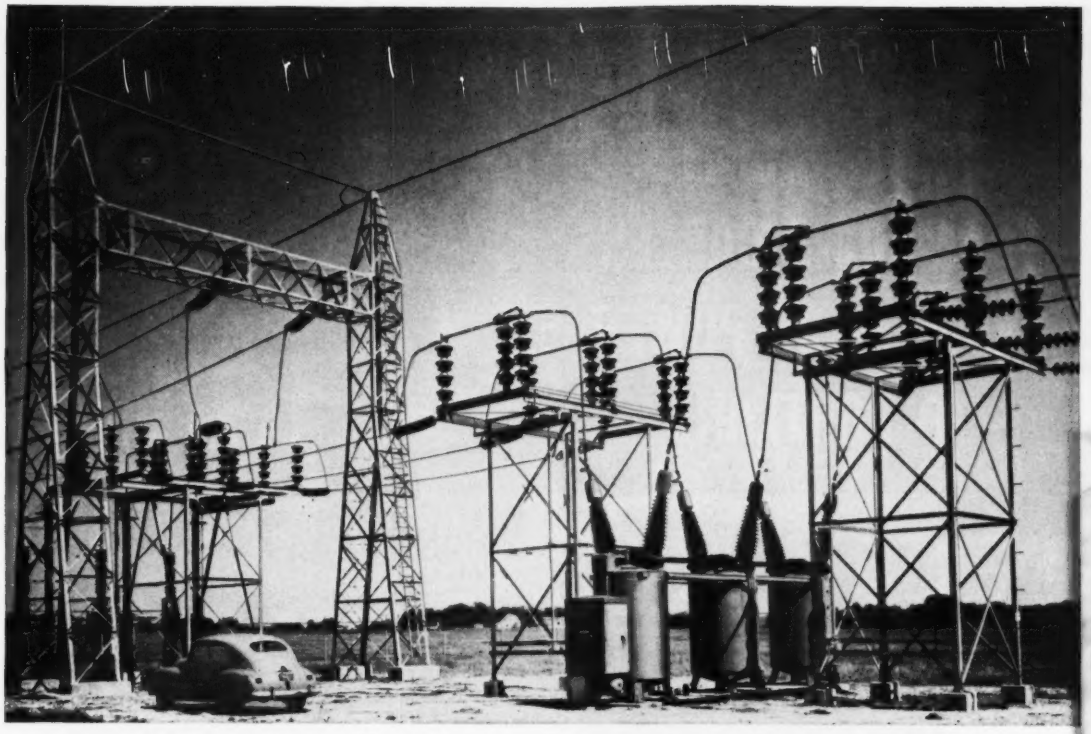
Development of these structures was a logical step in the trend towards increased standardization as a means of achieving maximum savings of time and money.



COLUMNS AND TRUSSES—Square or rectangular columns in lengths of 13'6" through 38'. Together with flat and box-type trusses, they form easily assembled "building blocks" for a wide variety of structures for mounting switches, fuses, lightning arresters, buswork, current transformers and other equipment.



SWITCH AND DEAD-END TOWERS—These towers are available in standardized dimensions to suit various voltage ratings. Design is based on a long experience with similar structures and requirements expressed by a long list of users. Other equipment available includes insulator pedestals and equipment stands.



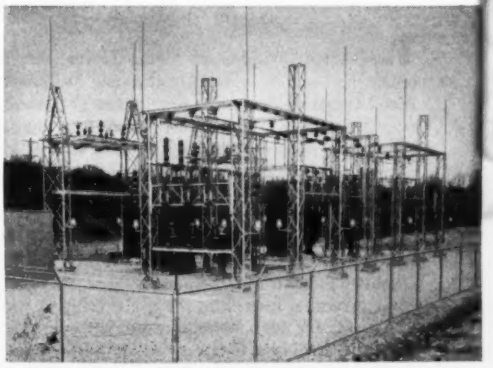
161-KV STATION showing use of standardized switch towers and high tower with one horizontal truss. This station was erected by the St. Joseph Light and Power Co., Marysville, Mo., one of the many users of G-E standardized outdoor stations.

Complete stations in standardized, pre-designed units—adaptable to every type of layout

The two outdoor stations shown here are typical examples of "building block" construction using G-E standardized structures, together with G-E switchgear, transformers and other equipment.

By ordering complete G-E outdoor stations with pre-designed, standardized structures, the tedious job of engineering and detailing separately ordered items is avoided. There is only one specification, one purchase transaction for each station. And with less time lost on detailed structural engineering, personnel can give more attention to the more important work of long range system planning.

For details of G-E standardized structures, write for Bulletin GEA-5573. For other information to help in outdoor station planning, ask for GEA-1040—Power Transformers, GEA-4985, 1642 and 4407—Oil Circuit Breakers, GEA-4980—RF Disconnecting Switches, and GEA-1304—Thyrite Lightning Arresters. *General Electric Co., Schenectady 5, New York.*



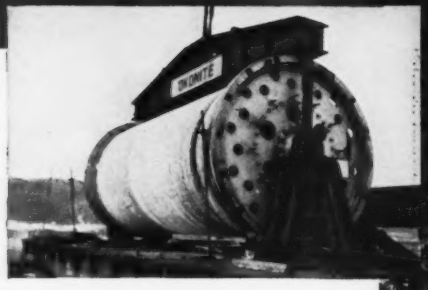
CINCINNATI GAS & ELECTRIC CO. MIDWAY STATION constructed entirely of G-E standardized structural units including latticed columns and trusses. Use of these components saved time and expense in designing, and expedited erection.

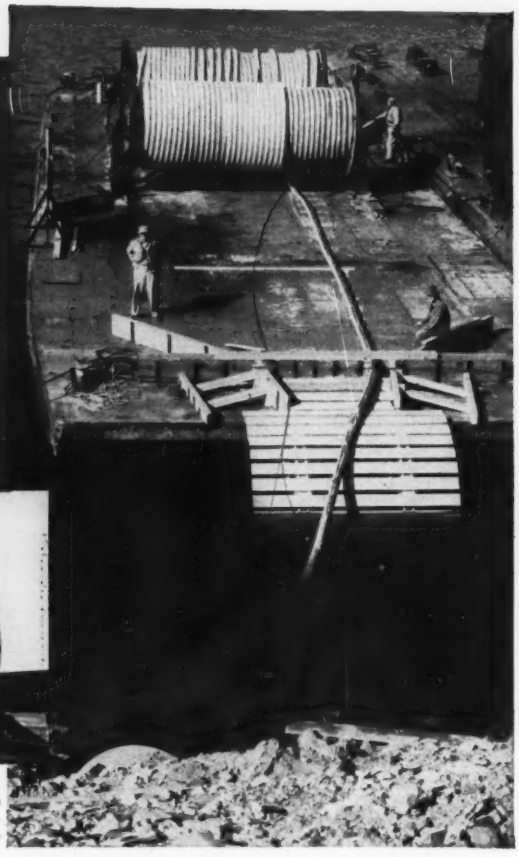
GENERAL ELECTRIC

353-5

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

GIANT OKONITE SUBMARINE CABLES BRING MORE POWER TO PORTLAND





Over 55 tons of 5-inch Okonite cable . . . laid across the Willamette River by Portland General Electric Company in just 40 minutes! Okonite reels were specially designed to expedite the job.

Two 13 Kv Okonite submarine cables were recently laid simultaneously across the Willamette River, Portland, Oregon in 40 minutes. This notable engineering feat represents a vital transmission link between a power plant on the east side of the city with the underground system in the west side business district.

Measuring 5 inches in diameter and weighing 31 pounds per foot, these 1800-foot rubber insulated cables were protected by steel armor wire. Special Okonite-designed reels helped to speed the laying.

Of particular interest in the engineering of these cables was the high voltage testing used to check out any tiny hidden defects which would not show up under ordinarily-specified test voltages. Designed for operation at 13,000 volts, these cables were tested at 93,000 volts for 15 minutes at d-c during fabrication. After armoring they were tested at 75,000 volts for the same period at d-c — in addition to a-c high voltage tests.

The 500,000 CM conductors in these cables were insulated by the famous Okonite strip process, assuring absolute uniformity of wall thickness . . . perfectly centered conductors. As in other Okonite cables, the insulated conductors were vulcanized in a continuous metal mold under high pressure, resulting in higher density, greater physical and electrical uniformity.

No matter what Okonite cable you buy, you can be sure of obtaining true cable economy . . . the economy of long life and uninterrupted service. The Okonite Company, Passaic, N. J.

THE BEST CABLE IS YOUR BEST POLICY

OKONITE insulated wires and cables

Marcus Transformer Co. has used HARVEL 912-C for years . . . "FOR TOP-QUALITY INSULATION AT MODERATE COST"

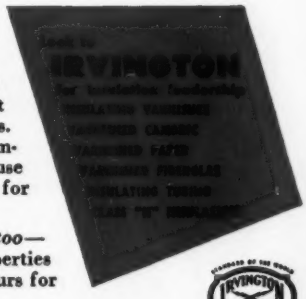
A consistent user of Harvel Internal Curing Varnishes ever since 1936, Marcus Transformer Co., Hillside, N. J.—one of the world's largest manufacturers of dry type transformers—naturally investigated Harvel 912-C as soon as Irvington Varnish & Insulator Company placed this product on the market.

Result: **Marcus has been using 912-C ever since—to the complete satisfaction of Marcus *and Marcus customers.***

Reasons: **Harvel 912-C bonds conductors firmly into a solid, compact mass—has a dielectric strength of 2200 vpm—*retains* its excellent mechanical and electrical properties even at elevated temperatures.**

Other advantages: **Harvel 912-C gives equally outstanding performance in other types of transformers or in rotating machinery—because it is completely oilproof . . . free from soft, tacky interiors . . . ideal for high peripheral speeds.**

You **can get all these features—and speed up your production *too*—when you use Harvel 912-C. In many cases, its fast curing properties cut baking time in half! The full story on Harvel 912-C is yours for the asking—just fill out the coupon below.**



Send this convenient coupon now

Irvington

VARNISH & INSULATOR COMPANY

Irvington 11, New Jersey

Plants: El Monte, California Hamilton, Ontario, Canada

Irvington Varnish & Insulator Company **EWe 9/51**
6D Argyle Terrace, Irvington, N. J.

Gentlemen:

Please send me technical literature on Harvel 912-C Internal Curing Insulating Varnish.

Name_____

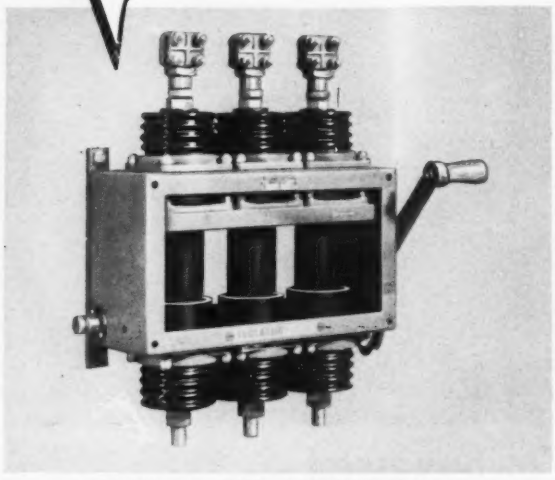
Company_____

Street_____

City_____ **Zone**_____ **State**_____

Represented in the western states by C. D. LaMoree, Los Angeles, Berkeley, Seattle, Portland; Electric Motor Supply Company, Denver

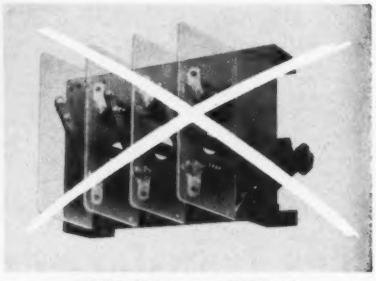
DISCONNECT HIGH-VOLTAGE APPARATUS THE MODERN WAY



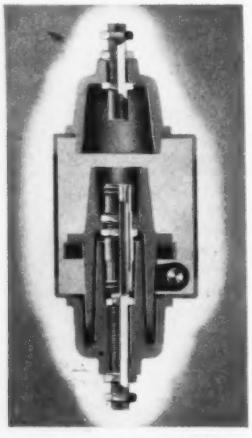
3.P.S.T. 600 ampere 7500 volt ISOLATOR with clamp type terminals on upper studs.

Loads can still be hauled by a horse and wagon, but it's rarely done anymore.

Likewise high voltage apparatus can still be disconnected using blade type disconnects, but the Three E ISOLATOR provides a better way.



3.P.S.T. 600 ampere 7500 volt blade type disconnect.



Cross sectional view of 400 ampere 5000 volt ISOLATOR in open position.

ISOLATORS *save in these ways.*

1 SPACE

Opened or closed, the ISOLATOR occupies only the space normally allotted for passage of conductors. This is about one half the space required for a similarly rated blade type disconnect.

2 MATERIALS

Insulating barriers, steel for enclosures, bus supports, and jumper connections can be saved by using ISOLATORS.

3 ACCIDENTS

Current paths of the ISOLATOR are enclosed in insulation and terminal connections arranged for easy taping, therefore accidental contact is not possible. Blades and clips of conventional disconnects always present a hazard.

You Can Do It Better With An ISOLATOR

ISOLATORS are built for ampere ratings to 2000 and for voltage ratings to 15000.

Ask for bulletin 140. It gives the complete ISOLATOR story.

THREE E — ELECTRICAL ENGINEERS EQUIPMENT CO.

MELROSE PARK, ILLINOIS

40% Saved on new wiring

At Stewart-Warner Electric's radio and television plant in Chicago, 4/0 Aluminum RH insulated conductor supplies 440-volt AC power for a new assembly line. Savings due to using Aluminum amounted to over 40% because of the cable's low initial cost and the easier, faster installation of the lighter-in-weight metal.

Electricians Howard Norton (left) and Al Iverson soldering aluminum connections at distribution panel. *Below:* Howard Norton, looking over completed job at panel said, "Aluminum is very satisfactory to install because of its lightness and workability . . ."

figure your new wiring job in Aluminum and figure low

Get prices both ways—in Alcoa Aluminum and in copper. See for yourself the worth-while savings possible when you plan wiring for production lines, new power feeders or improved wiring for higher capacities.

Although the rearmament program restricts the use of Aluminum we are ready to help you with the planning for trouble-free, low-cost wiring. For information write ALUMINUM COMPANY OF AMERICA, 1777J Gulf Bldg., Pittsburgh 19, Penna.

Aluminum Conductors

ALCOA ALUMINUM

of ALCOA EC ALUMINUM are made by leading manufacturers

This cutout is liberally designed—has high dielectric strength, uses silver-plated contacts, provides full-range interruption of fault currents, and is conservatively rated as to interrupting capacity. All live parts are completely enclosed for maximum safety.

4 CUTOUTS IN ONE

by simply changing doors

AND THAT'S ONLY HALF THE STORY! By stocking only three interchangeable doors which fit both 5.2 and 7.8 kv, 50-ampere housings, you get the 4 operating functions illustrated below—a total of eight essential cutout combinations! Available also in 100-ampere ratings, this unique flexibility reduces inventory and simplifies stocks.

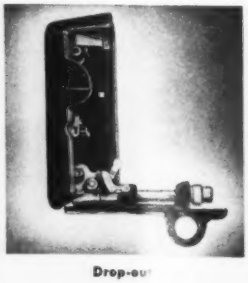
INDICATING OR DROPOUT WITH A TWIST OF THE WRIST! A small wire yoke, easily inserted or removed, determines whether the fuseholder door "kicks out" at the bottom for visual indication, or drops open—either way giving positive evidence of a blown fuse.

RECLOSING DOOR AVOIDS UNNECESSARY SERVICE TRIP! The two-element reclosing door restores service within one second after a temporary fault blows the first fuse link. By avoiding an extra service trip, the two-shot cutout pays for itself the first time it operates!

FLEXIBLE DISCONNECT BLADE CAN'T GET LOST! It's fastened to the door—can't be misplaced. This disconnect blade doubles the continuous current rating of the cutout. When the blade is disconnected and the door closed, the flexible cable extends downward to indicate that the circuit is open.

Only G.E. offers you this flexibility of cutout applications. For complete information contact your G-E sales representative, or write for Bulletin GEA-3448. *General Electric Co., Schenectady 5, New York.*

Indicating


Drop-out

Reclosing

Disconnect

GENERAL ELECTRIC

406-39

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

"What's Cookin'" on the other side of the mountain?

WHEN a locomotive engineer heads his train into a miles long tunnel under a mountain he wants to be reasonably sure that the track is clear not only in the tunnel but on the other side too. Frequently the only way he can get that information is through signal systems. When they are sitting on a siding signal cables may not look like much but once they are installed and connected they are a most important piece of equipment to a locomotive engineer.

Railroad Signal Cables carry a heavy burden of responsibility for the safety of passing trains. For that reason Railroad Signal Engineers are more often than not apt to be very "choosy" about the kind of signaling equipment they buy and install. More and more these days you will see Simplex-ANHYDREX Signal Cables like these being installed by railroads all over this country.

These cables are installed underground and overhead, in tunnels or in bright burning desert sunlight, on signal bridges across busy terminal tracks or buried in the slime and mud of swampy land. Why this trend to ANHYDREX Signal Cables? Because they are dependable. Regardless of the operating conditions if they are properly installed ANHYDREX Signal Cables will operate dependably year in and year out.

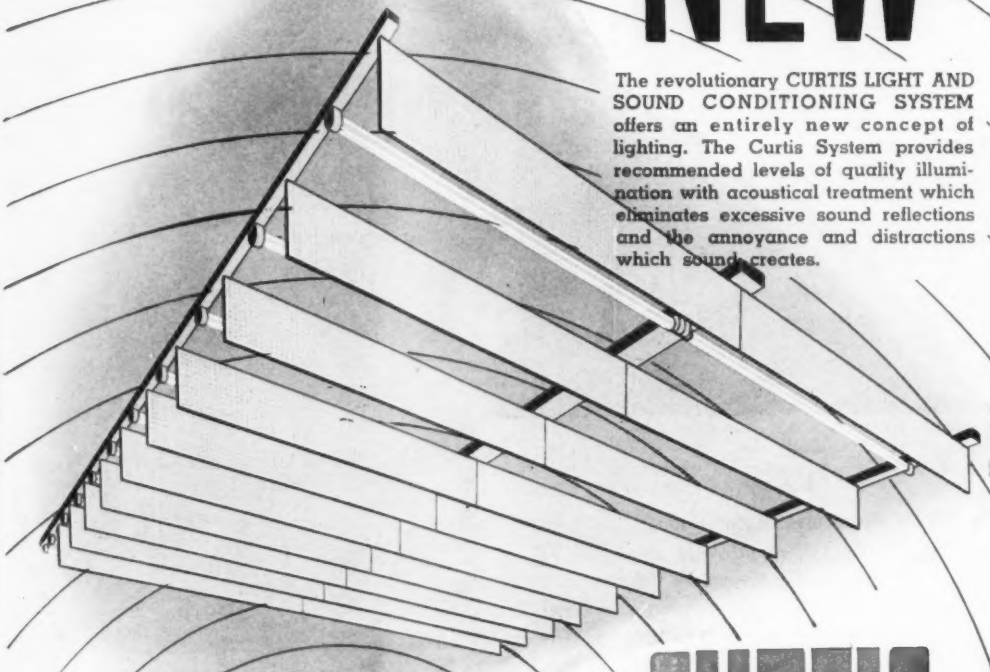
If you have a power, signal or control cable problem we will be glad to discuss it with you and make recommendations based on nearly seventy years experience.

SIMPLEX-ANHYDREX

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

NEW

The revolutionary CURTIS LIGHT AND SOUND CONDITIONING SYSTEM offers an entirely new concept of lighting. The Curtis System provides recommended levels of quality illumination with acoustical treatment which eliminates excessive sound reflections and the annoyance and distractions which sound creates.



CURTIS

LIGHT SOUND CONDITIONING

SYSTEM

PAT APPLIED FOR

CURTIS LIGHTING, INC.

Write Dept. 116-05 for information about the Curtis Light and Sound Conditioning System's unlimited applications

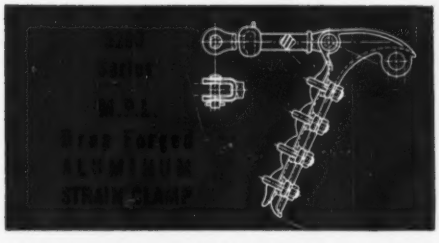
6135 WEST 65TH STREET, CHICAGO 38, ILLINOIS

Life-line
from America's mightiest falls

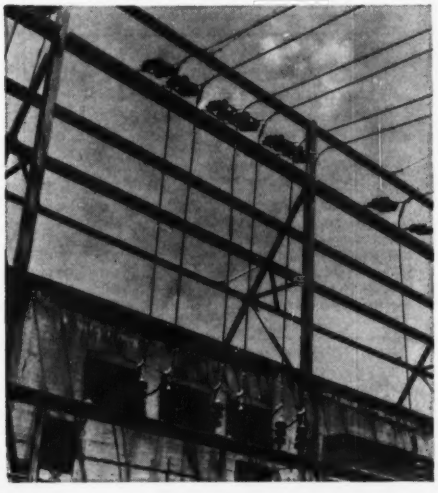
Power generated by mighty Niagara Falls is carried for 3 miles over these Niagara Mohawk Power Corporation lines — from the company's hydroelectric station at the falls to a nearby switching station.

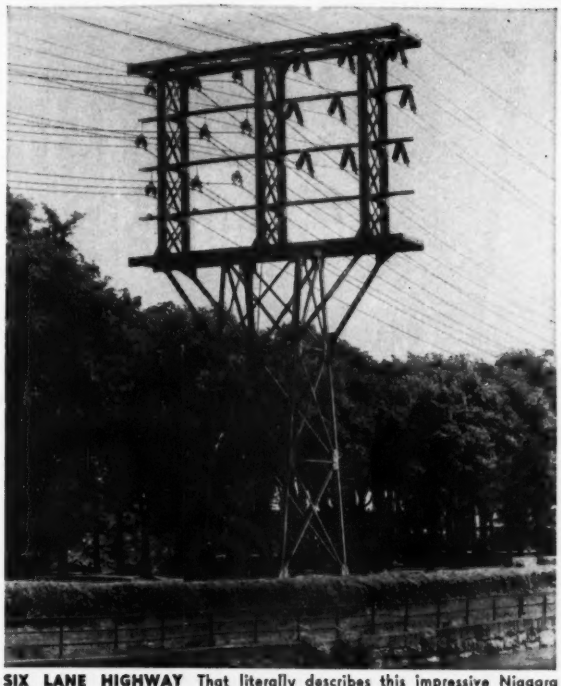
The lines, which serve chemical and metallurgical industries in the area, were constructed prior to 1925. Because of the high currents transmitted and the corrosive atmosphere encountered, they were reinsulated in 1950 with fog type insulators and BTC Drop Forged Bronze Clamps.

Select BTC Drop Forged Clamps and Fittings for all your transmission line projects. You'll find — as so many major power companies and construction firms have — that they're easier to install, give efficient trouble-free performance and help keep maintenance at a minimum.

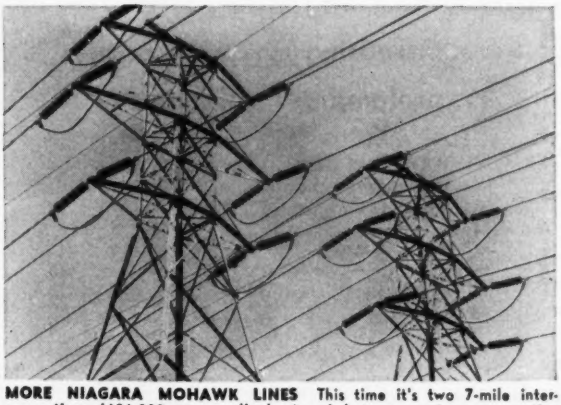


SPEAKING OF CONNECTIONS Here's a view of generator connections at Niagara Mohawk's hydroelectric station. Power is transmitted over 12 kv lines having two 500 mcm copper conductors per phase.





SIX LANE HIGHWAY That literally describes this impressive Niagara Mohawk structure! It carries three 12 kv lines (1,000 mcm copper) and three 69 kv lines (500 mcm copper).



MORE NIAGARA MOHAWK LINES This time it's two 7-mile interconnections (636,000 cm — all aluminum) between a steam generating plant at Dunkirk, N. Y. and the company's 115 kv bulk power system. Note the continuous span-jumper construction and absence of jumper splicing. The design of the BTC Drop Forged Aluminum Strain Clamps used on these lines makes it easy to string through the clamps without cutting the conductor — good insurance against jumper splice trouble.

Sold Through Your Insulator Manufacturer Only

Drop Forged BTC *Hi-Line Hardware*

The BREWER-TITCHENER Corporation

Cortland • New York

Cables run COOLER... in TRANSITE DUCTS

... reducing copper losses

... increasing current capacity

... prolonging insulation life

HERE'S HOW to reduce copper losses ... increase current carrying capacity ... and prolong insulation life—run your cables in Transite* Ducts.

Current carrying capacities can be increased in a typical duct bank as much as 5%, or I^2R losses can be reduced 11%, for cables located in Transite as compared with other ducts used for power circuits.

And, Transite Ducts assure permanent duct banks because Transite is incombustible; is immune to rust and rot; is unaffected by electrolysis; will not slag under action of an arc, and will retain its high original strength.

An unusually smooth bore assures no injury to cable sheath, either in natural movement under load, or when pulling-in cables. Long, lightweight lengths can be quickly and economically installed.

In addition, a full line of fittings simplifies even the most complicated of installations.

For full information on Transite Ducts, write for Data Book DS-410. Johns-Manville, Box 290, New York 16, N. Y.

*Reg. U. S. Pat. Off.

How Transite Ducts increase current carrying capacities

Type cable 3 cdr. 500 MCM Compack Sector, 15 KV (6th Edition AEIC Spec.)
No. of cables—3 (all located in one bank)
Daily Load Factor—75%

Earth Temp. ambient—20 C	Transite	Other
Total Therm. Res. to Dielectric Loss (C watts/ft.)	5.66	6.17
Total Therm. Res. to Copper Loss (C watts/ft.)	4.44	4.95
Temp. Rise from Dielectric Loss (C)	1.9	2.1
Allowable Rise for Copper Loss (C)	59.1	58.9
Allowable Watts per ft. cable	4.44	3.96
Allowable Current—(Amps. per cdr.)	386.	365.
Allowable Current—(Relative %)	105.6	100.

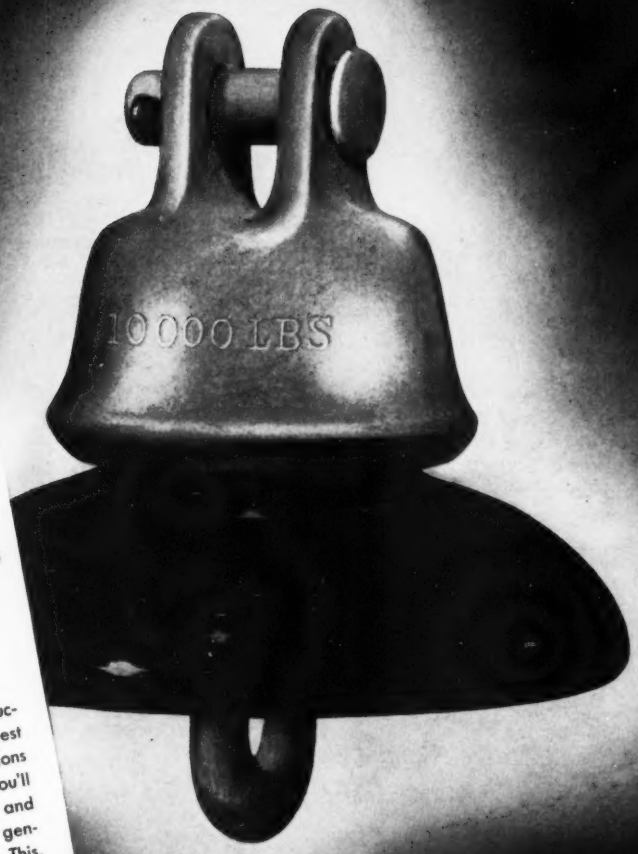
Johns-Manville *Transite Ducts* "KORDUCT"— for encasement in concrete

"CONDUIT"— for use exposed and underground without encasement

LOCKE

presents masterpieces of

insulator engineering



Perfection

...in low voltage suspensions typified by

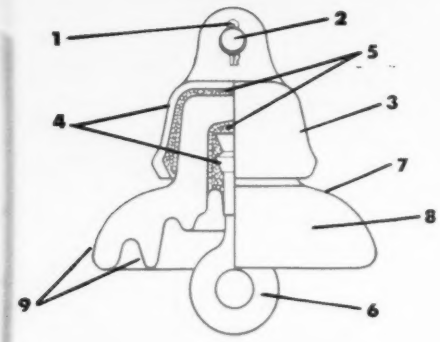
LOCKE'S

No. 16583

Take this step toward further reducing your cost per kilowatt hour. Test Locke's Low Voltage Suspensions on a dollars-and-cents basis. You'll find that excellence of design and manufacture enable them to generally out-perform all others. This, of course, is the reason why utilities have specified them by the tens of millions since their original development in 1904.

Presenting A MASTERPIECE OF INSULATOR ENGINEERING

The LOCKE low voltage Suspension Insulator



You get ALL these advantages in this LOCKE DESIGN

1. Humped cotter key saves time and labor because linemen can install and remove cotter bolt faster, easier.

2. High strength cotter bolt assures service continuity.

3. Top quality forged steel or malleable iron caps, and forged eyes . . . add years of dependable service to the insulator.

4. Corrosive action on metal parts due to action of cement is eliminated because these surfaces are coated with a special non-hardening, resilient coating. This coating not only acts as an expansion joint which eliminates breakage due to temperature changes, but it also helps distribute loads efficiently.

5. Locke Compression Sand, applied at both cement joints, gives added strength and stability to the insulator.

6. Hot line work is greatly simplified because ample clearance is provided between the eye and the porcelain . . . and because of the humped cotter key at the top of the insulator.

7. The possibility of breakage, caused by thermal shock and mechanical impact, is greatly lessened because porcelain surface is covered with Locke Compression Glaze.

8. Because Locke Wet-Process porcelain is used throughout, the insulator is fully capable of withstanding power arcs, lightning flashovers and extremely rough handling.

9. You get highly satisfactory performance during electrical storms and rains because of adequate flashover ratings . . . and maximum leakage distance.

YOU ARE EQUALLY SURE of getting a masterpiece of design when you specify other products in the complete line of Locke Insulators and suspension hardware. Each pays off in superior performance on transmission and distribution lines, generating stations, sub-station and electrical apparatus. Locke Department, General Electric Company, Baltimore, Maryland.

LOCKE

LOW VOLTAGE PIN TYPE INSULATORS

HIGH VOLTAGE PIN TYPE INSULATORS

SUSPENSION INSULATORS

SWITCH & BUS INSULATORS

SPOOL INSULATORS

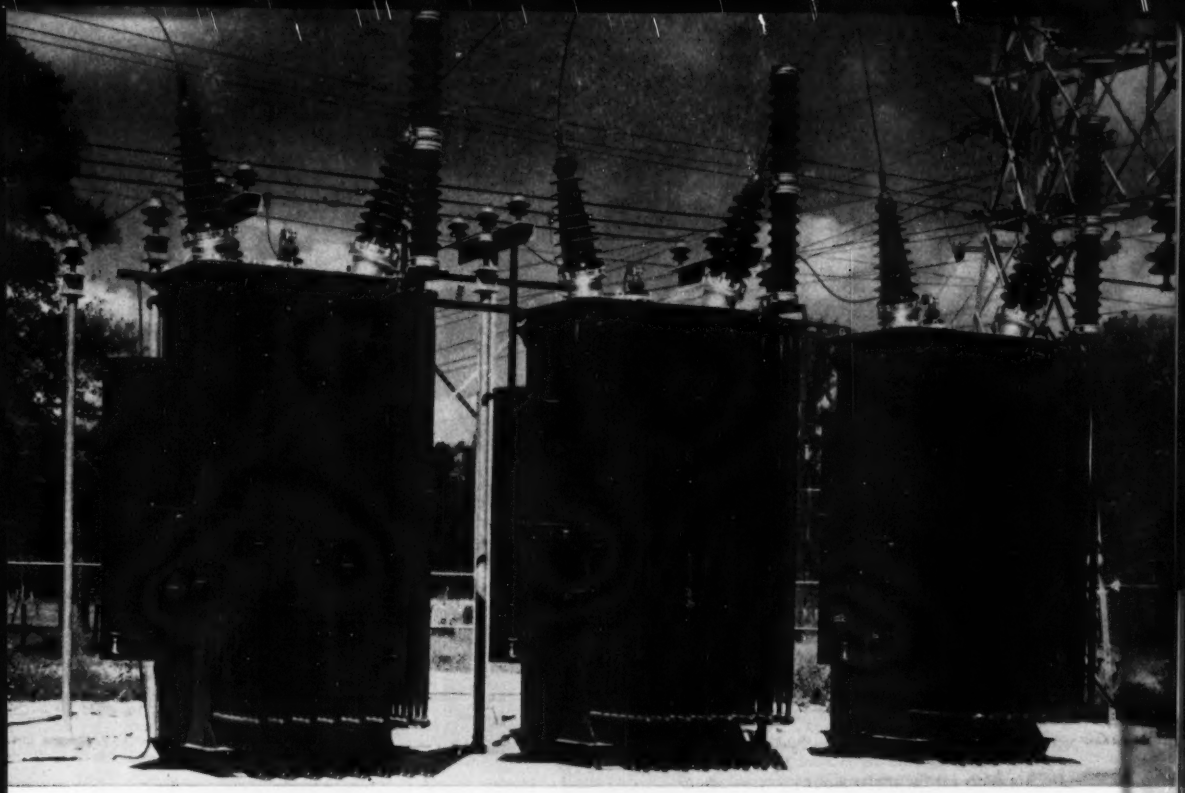
GUY INSULATORS

LIQUID-FILLED BUSHINGS

SUSPENSION & STRAIN CLAMPS

SUSPENSION HARDWARE

ENTRANCE BUSHINGS



THREE REPETITIVE-MANUFACTURE TRANSFORMERS installed at a substation of a large utility in southeast Texas. They are each rated 1000-kva, single-phase, 67,000 volts to 7620/13200Y. Cylindrical auxiliary tanks contain oil and an inert gas which excludes oxygen, preserves the insulating oil in main tanks.

Utility Saves 7 Weeks and $3054 on Six Transformers by Ordering RM

Lower prices and faster shipments have sold a Southeast Texas Utility on the RM* idea.

A recent specific order shows why: Six transformers were ordered for two important substations. Each was a single-phase, 1000-kva unit—step-down from 67,000 volts to 7620/13200 volts Y. The net price for one of these RM units was $5738, while the net price for a comparable nonstandard transformer was $6247. Total saving—because the utility purchased RM—was $3054, and what is equally important, shipment was made in 11 weeks, versus an average delivery at that time of 18 weeks on non-standard transformers of similar ratings.

Are you taking full advantage of RM? Available in single- and three-phase ratings, with or without load-ratio control and fan cooling, RM transformers are easy to apply to your system. For complete listings and application information, write for Bulletin GEC-479, *Apparatus Department, General Electric Co., Schenectady 5, N. Y.*

*RM stands for "Repetitive Manufacture." By using standardized construction methods, General Electric builds RM power transformers more economically—delivers them faster. RM designs are available in ratings 10,000 kva and below and up to 69-kv, with many optional features.

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

MEMO:

To Manufacturers of Electrical Equipment requiring Bushings or Special Porcelain

Pinco for many years, has been expanding its special porcelain facilities to meet the ever increasing demand for custom-made porcelain by electrical equipment manufacturers. The fact that many applications of porcelain insulation are of a special nature thereby requiring specially designed and fabricated porcelain, accounts for the tremendous growth of this particular phase of our business.

In addition to custom-made porcelain, Pinco also produces a standard line of dry type Transformer Bushings, such as the L2657 shown here. These Bushings are equipped with standard terminals and are furnished completely assembled with the necessary hardware ready for mounting on transformers or other applicable equipment. Made by the famous Pinco wet plastic porcelain process, these Bushings embody all of the superior electrical and mechanical qualities which characterize Pinco transmission and distribution insulators.

PINCO L 2567
Dry Type Bushing

SPECIFICATIONS
Voltage Rating 8.6
Ampere Rating ..... 400 Amp.
Max. Cable Size ... 400,000 C.M.

Quotations on Pinco special porcelain are made from customer blue print or sketch. If you wish, our engineering department will assist you in designing the porcelain you require. *Refer to Pinco Catalog No. 49 for complete specifications on standard bushings.*

The Porcelain Insulator Corporation
769 Main St., Lima, N. Y.

Warehoused and Distributed by JOSLYN PACIFIC CO.
2424 FIRST AVENUE SOUTH ..... SEATTLE 4, WASHINGTON
180 POTRERO AVENUE ..... SAN FRANCISCO 3, CALIFORNIA
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PINCO INSULATORS

Suspension Insulators . . . Switch and Bus Insulators . . . Distribution Clamps . . . Distribution Pin Types and Guy Strains . . . Transmission Line Fittings . . . Tree Insulators . . . Transformer and Circuit Breaker Bushings . . . One Piece and Multi-part High Voltage Pin Types . . . Suspension and Strain Clamps . . . Indoor Bus Support Porcelain . . . Lightning Arrester Porcelain.

ELECTRICAL BOOKS

An Introduction to the Theory of Control in Mechanical Engineering, by R. H. Macmillan, 195 pages, 7½x11, Cambridge University Press, $6. The first English book on this subject, it explains the principles that underlie action of automatic controls, servomechanisms and regulators. Although introductory, it gives account of the most recent work in using automatic equipment; includes examples for study, and an extensive bibliography.

Nomographic Charts, by C. Albert Kulman, 244 pages, 7½x10, McGraw-Hill Book Co., $6.50. The 92 charts, gathered over a period of years, are presented as time-saving devices on engineering and mathematical computations. They are of particular usefulness in hydraulics, mechanics, thermodynamics and electric engineering fields. Each chart has explanation as an aid in using it.

Electric Transmission Lines, by Hugh Hildreth Skilling, 438 pages, 6x9, McGraw-Hill Book Co., $6.50. A text suitable for power and communication students, offering a broad presentation of theory of circuits with distributed constants, valid at all frequencies. Applications of the theory include radio frequency, power and telephone lines; filters and wave guides. Diagrams, tables and problems are included. Lines at microwave frequency are quite fully covered, and the discussion is extended to hollow-wave guides.

Principles of Electrical Engineering, fourth edition, by W. T. Timbie, Vannevar Bush and G. B. Hoadley, 626 pages, 6x9, John Wiley & Sons Inc., $6.50. The experience gained by the authors in teaching and preparing the previous editions is reflected in this issue. Topics and methods stressed are: analyzing electric and magnetic problems; circuit analysis; fundamental problems of electric and magnetic fields; and their relation to circuit analysis. Material is developed from mathematical physics, but the aspects relevant to electrical engineering are stressed.

Electronics, second edition, by Jacob Millman and Samuel Seely, 598 pages, 6x9, $7.25. Thoroughly revised and modernized, this edition includes material on cathode-ray tubes, electron theory of matter, kinetic theory of gases, electrical discharges in gases, triodes as circuit elements, F-M cyclotron, betatron, klystron, excitrons and potential fields in vacuum tubes; rearrangement of material on rectifiers; and two chapters on the electron theory of matter. New line drawings, examples and problems are included.

Transients in Power Systems, by Harold A. Peterson, 361 pages, 6x9, John Wiley & Sons Inc., $6.50. Professor Peterson has organized many investigations with improved tools such as the differential and transient analyzers, and presents the significant data in quickly usable form. The book is intended to serve as combination reference and textbook. It is one of a series written by General Electric Associates for the advancement of engineering practice.

The NEW KEARNEY *Group Operated*

ROTATING INSULATOR TYPE DISCONNECT SWITCH

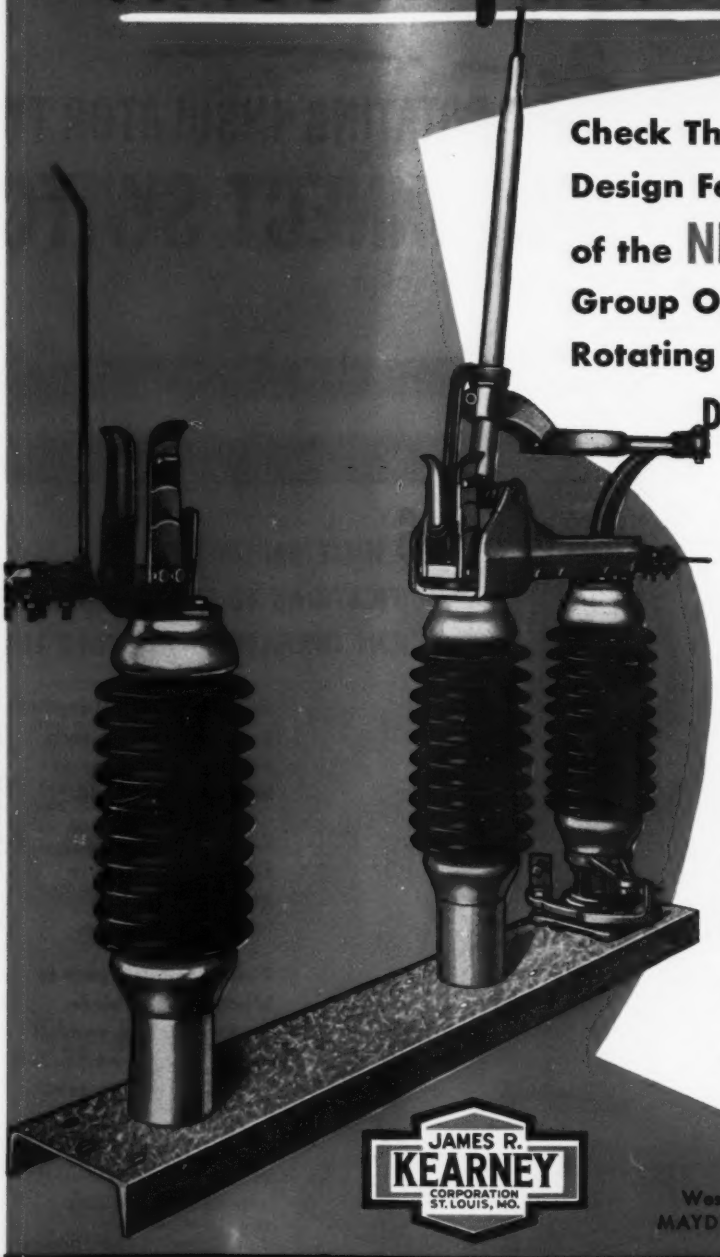
HAS THESE IMPORTANT MODIFICATIONS TO PROVIDE MORE EFFICIENT OPERATION — LONGER LIFE:

1. Heavy leaf type beryllium copper spring contacts with silver overlay at both ends of blade.
2. Fully adjustable to compensate for any changes in switch mounting structure.
3. Positive current path to blade through blade contacts at both ends of switch. Hinge mechanism does not carry current.

JAMES R. KEARNEY CORPORATION
4224-42 Clayton Avenue
St. Louis 10, Missouri
Canadian Plant: Guelph, Ontario

See the following pages for additional features of this improved Kearney Switch

These Improvements



Check These Advanced Design Features of the NEW KEARNEY Group Operated Rotating Insulator Type DISCONNECT SWITCH

- √ Streamlined design with smooth edges throughout.
- √ Stop on base bearing easily adjusted to synchronize break on each phase.
- √ Blade operates in two Oilite bearings for all temperature operation. Bearings require no maintenance or lubrication.
- √ Blade lever adjustment sealed with noncorrosive grease.
- √ Stainless steel spring in neoprene jacket. Easily adjusted for desired counterbalance. (On switches rated 34.5KV and up.)
- √ Main hinge pin rotates in Oilite bearing.
- √ Arm rotates in completely weather-protected Oilite bearing in frame.
- √ Single arcing horn operates easily under ice. Easily replaced when necessary.
- √ Tubular, electrolytic bus bar copper blade.

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO.

West Coast Distributor: MAYDWELL & HARTZELL

175

Specify KEARNEY Products . . .

Guarantee

COOLER, MAINTENANCE-FREE OPERATION

With this switch you get dependable performance under every variety of weather and operating conditions.

Kearney GROUP Operated Disconnect Switch Rotating Insulator Type
600 Amps., 7.5KV to 69KV;
400 Amps., 7.5KV to 34.5KV.

Write for more detailed information
Ask for bulletin S-53

JAMES B. KEARNEY CORPORATION
4224-42 Clayton Avenue • St. Louis 10, Missouri
Canadian Plant: Guelph, Ontario

Better Construction – SAFER Maintenance

"Off-the-Shelf" DELIVERY USING THESE STANDARDIZED COMPONENTS

New Square D MHP DISTRIBUTION PANELETTE

DESIGN LEADERSHIP

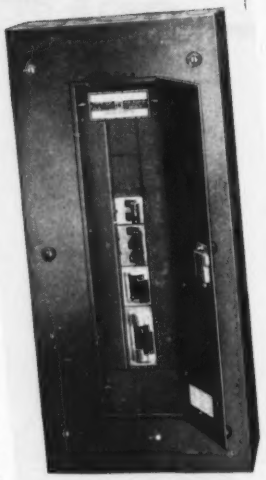
See Square D's new MHP CIRCUIT BREAKER DISTRIBUTION PANELETTE for 240 Volt, 3 Phase, 3 or 4 wire power systems. Varying job requirements can be met by using different combinations of standardized components available from Electrical Distributor stocks.

1 INTERIOR consists of three cylindrical bus bars, neutral plate and necessary barriers firmly supported on an insulated steel pan and equipped with a breaker-retaining trim plate held in place by four thumb screws. Unused breaker mounting space is covered by a scored sliding plate. Extra plate length is easily broken off.

2 "PLUG-IN" BREAKERS are thermal-magnetic. Positive pressure jaws tightly grip round bus bars. Available in 15 to 100 amperes, 240 volts A.C., two and three pole common trip units, for motor loads—15 to 50 amperes, 120 volts A.C., two individual trip single poles per unit, for lighting loads.

3 TRIM has door with directory frame and flush lock with standard keying. Available flush or surface.

4 BOX is 5¾" deep and either 14" (single row) or 20" (double row) wide. Available in four basic lengths with ample knockouts and large wiring gutters.



for descriptive bulletin, *Write* Square D Company, 4335 Valley Blvd., Los Angeles 32, Calif.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

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SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S. A., MEXICO CITY, D. F.

For LOW-COST LIGHTNING PROTECTION that's PERMANENT use Copperweld Ground Rods and Clamps

TRADE MARK

Struck 12 times during a single storm and 48 times in one year, the Empire State Building disproves the old saying that "lightning never strikes twice in the same place."

LOOK FOR THE NAME "COPPERWELD" — IT PROTECTS YOU!

YOU NEVER KNOW WHERE, WHEN, OR HOW OFTEN LIGHTNING WILL STRIKE . . . but you can secure safe, permanent and economical grounding protection when you install Copperweld* Ground Rods and Clamps. For every grounding application requiring the use of driven electrodes, these superior ground rods offer you these important advantages:

1. *Molten-Weld*—Permanent interlocking weld between the copper and alloy steel eliminates possibility of electrolytic action. No other ground rod has this inseparable union, accomplished only by the proved Copperweld Molten-Welding process.
2. *Ease of Installation* — Copperweld's extra-strong alloy steel core assures rigidity and easy driving even through very hard soils.
3. *High Conductivity*—Copperweld's thick sheath of pure copper provides excellent electrical conductance. Copper-to-copper contacts throughout insure low resistance.
4. *Protection Against Rust* — Copperweld's heavy copper armor permanently protects the alloy steel core against corrosion.
5. *Greater Economy* — Longer service life with no maintenance costs.

Start now to reduce outages and insure continuity of service by using Copperweld Ground Rods and Clamps. They provide safe, permanent, low-cost grounding protection at all types of locations—at poles, at towers, at power stations, at substations, at buildings — and for all grounding purposes.

COSTS YOU LESS Copperweld BECAUSE IT LASTS LONGER

MADE BY COPPERWELD STEEL COMPANY GLASSPORT, PA.

PACIFIC COAST OFFICE: MONADNOCK BLDG., SAN FRANCISCO

*Trade Mark

Stocked And Sold By:

HUBBARD AND COMPANY • JOSLYN MFG. & SUPPLY CO.

And All Their Distributors

HERE THEY ARE!

L-M's startling new type PHD

5 KV HEAVY DUTY CUTOUTS

Up to 20,000 amperes interrupting capacity

Interchangeable doors—standard, heavy duty, and switch blade types

50 and 100 ampere doors fit your present PVD® cutouts.

Here is the first and only complete line of cutouts for high power capacity distribution feeders—a complete line of type PHD 5 kv cutouts in 50, 100, and 200 ampere ratings, and with interchangeable doors in each rating.

These cutouts provide high interrupting capacity *as you need it*, without the extra cost for needless high *continuous* current rating. They are guaranteed to operate through the full range of fault currents.

Now you can install one of these new L-M cutouts with standard duty doors. As feeder load requirements change and fault currents increase, just make a heavy duty cutout out of it, by hooking on the heavy duty door. Doors for the 50 and 100 ampere cutouts also fit your *present* PVD's—so you can change those into heavy duty cutouts with these new doors! Switch blade door, either stationary or indicating, converts cutout into a disconnect switch in just 6 seconds. Warehousing and stocking are all greatly simplified!

OUTSTANDING DESIGN FEATURES

- **Housings wet-process porcelain, glazed inside and out.**
- **Hanger supports cemented into back of porcelain housings.**
- **All current carrying parts silver plated.**
- **New clamp type terminals with easily accessible large-head screws.**
- **Replaceable "bakelined" fuse cartridge tubes resist weathering and arcing.**
- **Spring-actuated flip-out device pulls fuse link down and out of tube, assuring instant separation of link parts, even with the smallest links and low fault currents.**

1. standard duty door—1200 amperes interrupting capacity

2. heavy duty door—8000-5000 amperes interrupting capacity

3. switch blade door—100 amperes continuous current rating

L-M HEAVY DUTY CUTOUTS

RATING	DOORS AVAILABLE	INTERRUPTING CAPACITY rms amperes 2.5 kv*	5 kv**
50 AMPERES	1. Standard duty, indicating	1,200 amp.	1,200 amp.
	2. Heavy duty, non-disconnecting	8,000 amp.	5,000 amp.
	3. Switch blade	100 amperes continuous current rating.	
100 AMPERES	4. Standard duty, indicating	3,000 amp.	3,000 amp.
	5. Heavy duty, non-disconnecting	14,000 amp.	10,000 amp.
	6. Switch blade	200 amperes continuous current rating.	
200 AMPERES	7. Heavy duty, indicating	20,000 amp.	15,000 amp.
	8. Switch blade	400 amperes continuous current rating.	

* or line-to-neutral 4160 or 4330 volts Gr. Y. ** or line-to-neutral 8330 volts Gr. Y.

Engineered for Safety

The lineman can remove the door completely, refuse and replace it, all with a switch stick. When door is open, all door parts are dead.

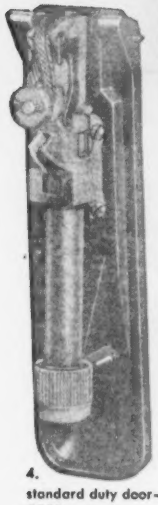
Get the Whole Story

Ask the L-M Field Engineer for more information or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

PHD is a Line Material Trademark

14,000 amperes interrupting capacity for **100** ampere cutout

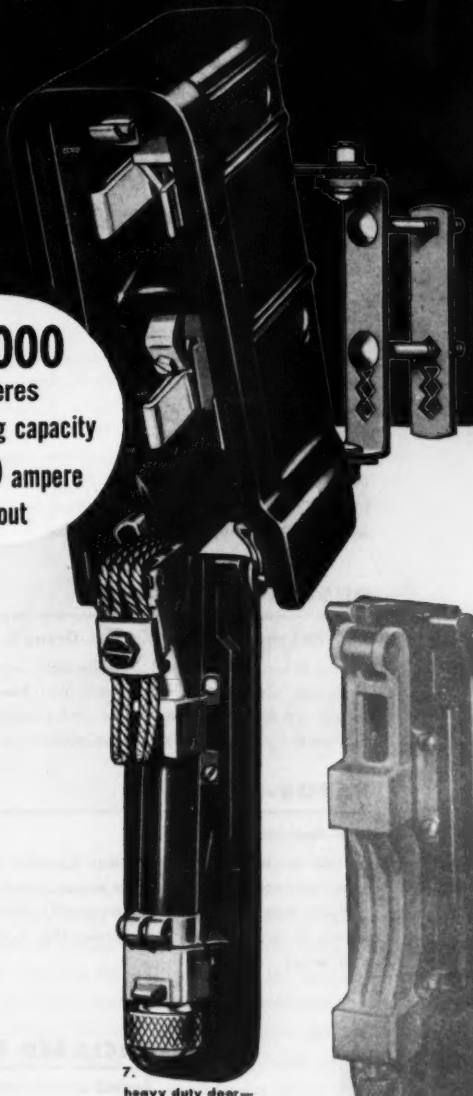
20,000 amperes interrupting capacity for **200** ampere cutout



4. standard duty door—3000 amperes interrupting capacity

5. heavy duty door—14,000-10,000 amperes interrupting capacity

6. switch blade door—200 amperes continuous current rating



7. heavy duty door—20,000-15,000 amperes interrupting capacity

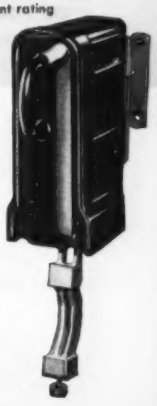
8. switch blade door—400 amperes continuous current rating

LM®

LINE MATERIAL

fuse cutouts

Complete Coordinated Equipment for Distribution Today



400 ampere disconnect switch in indicating position

Through the use of this new, higher-rated switch blade, the 200 ampere cutout can now be converted simply and quickly to a 400 ampere disconnecting switch for use on higher nominal current systems. Door can be closed with hinged blade in disconnect position below the box, giving positive indication that the line is open—a unique L-M feature.

Rely on Quality

INDUSTRIAL

PYLE-NATIONAL LIGHTING FIXTURES

for longer service life, added Safety and Efficiency

EXPLOSION-PROOF

Pyle-National LE Series (Class 1, Groups C and D)

For use in locations where highly flammable materials are manufactured or handled.

Rugged, flame-tight cast aluminum alloy housings render internal explosions harmless, and insure safe operating temperatures. Threaded construction permits easy access to interior for wiring and lamp replacement. Available in many types and sizes.

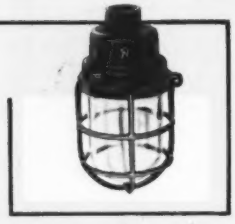
DUST-TIGHT

Pyle-National DE Series (Class II, Group E, F, G and Class III)

For use in locations where flammable dusts are present in quantity.

Strong, one-piece cast aluminum alloy housings are designed to exclude dust from the interior and to avoid accumulation of dust on the exterior surface. Available in many types and sizes.

VAPOR-TIGHT



Pyle-National BO Series

For use in any outdoor or indoor location subjected to heavy concentrations of non-flammable vapors, gases, dusts, or moisture.

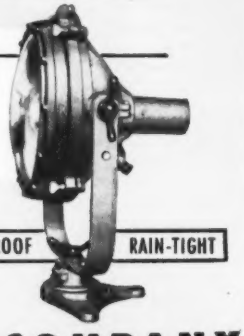
Heavy duty construction and especially efficient sealing features insures an exceptionally long service life. Full line for 10 to 200 watt lamps.

VAPOR-TIGHT SIGNAL OR PILOT LIGHTS

Midget Fixtures for 10 watt Lamps.

ENCLOSED FLOODLIGHTS

Sealed against moisture and dirt, constructed throughout of cast aluminum and other rugged, corrosion-proof materials, Pyle-National floodlights retain their original high-efficiency output throughout an exceptionally long service life, with negligible maintenance and replacement expense.



WEATHER-PROOF RAIN-TIGHT

SINCE 1897

THE PYLE-NATIONAL COMPANY

1364 N. KOSTNER AVENUE • CHICAGO 51, ILLINOIS

District Office and Representatives in Principal Cities of the United States. Export Department: International Railways Supply Co., 30 Church St., New York. Canadian Agent: The Holden Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver.

CONDUIT FITTINGS • PLUGS AND RECEPTACLES • TURBO-GENERATORS • GYRALITES • MULTI-VENT AIR DISTRIBUTION

BRANCH OFFICE: 25 Beale Street, San Francisco 6, Calif., YUkon 6-5498

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Shaffer & Nelson
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There's no instrument to measure value

According to national standards, station insulators are measured many ways - size, strength, thermal resistance, dielectric properties. These measurements assure a uniform product among manufacturers - *uniform except for value!* No instrument will tell how long the insulator will give satisfactory performance, yet this is the real measure of your dollar's worth . . .

Confirm this if you wish: the vast majority of O-B station insulators are bought by power companies some of whose records of performance go back as much as 30 years or more. Ignoring all sales arguments, these companies evaluate insulators on their own terms . . . Measured in dollars per year, there is still a bargain in station insulators - O-B!

Ohio Brass

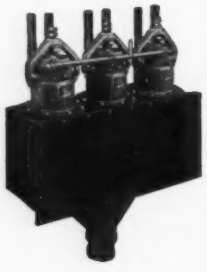
MANSFIELD • OHIO

4134-H

For PRIMARY CABLE SYSTEM FLEXIBILITY

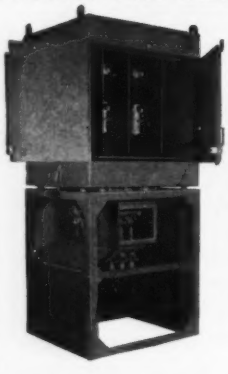
Use G & W Sectionalizing Equipment

PROTECT AND DISCONNECT SMALL LOADS



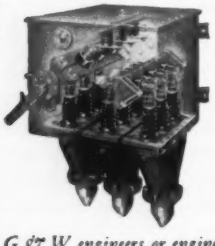
Type "FCBX" Fuse-Switch Boxes with gang-operated oil fuse cutouts mounted on cable connection compartments are rated 2500, 5000, and 8000 volts with interrupting capacities of 6000, 6000, and 3750 amperes (RMS per phase) respectively. When used within the limits of their short circuit interrupting capacity, Type "FCBX" units have wide application as primary disconnecting and protecting equipment at load distribution centers or at main sub-stations of small plants.

PROTECT AND DISCONNECT LARGER LOADS



Type "RA-SC" Fuse-Switch units with Type "RA" load break oil switches and Type "SM" power fuses are rated 7,500 and 15,000 volts with interrupting capacities of up to 30,000 amperes RMS. Continuous current carrying capacity of units and load break rating of switches is 400 amperes. A fused load can be supplied from either of two feeders through a double throw "RA" switch and the unit may be equipped with a G & W automatic transfer mechanism to assure service continuity if the normal feeder fails.

LOAD BREAK OIL SWITCHES



Type "RA" load break oil switches are made in any switching arrangement necessary to meet individual distribution problems. 7,500, 15,000, and 23,000 volt units with full 400 ampere load break are widely used in single and double throw units or in special units with two or more sets of links.

G & W engineers or engineering representatives will be glad to help you select the proper G & W equipment for your problem whether it requires a single unit or a complete primary distribution system.

Write for your copy of G & W Bulletin H49, a discussion of Primary Cable System Flexibility.

Use G & W Cable Accessories for
TERMINATING
FUSING—SWITCHING
SPLICING—CONNECTING

POTHEADS

Trouble-Free Cable Terminations

Capnut Style Disconnecting Straight Through Type "ST-SODERTITE"

Write for Bulletin AB51

OIL FUSE CUTOUTS

Single or Gang Operated Fuse-Switch Units

Write for Bulletin CA50

CABLE BOXES

Air or Oil Filled

Fuses, Links or Direct Connection

Many Sizes, Styles, Ratings

UNIT SPLICING KITS

Packaged Materials for Properly Designed Joints for all Types of Cables

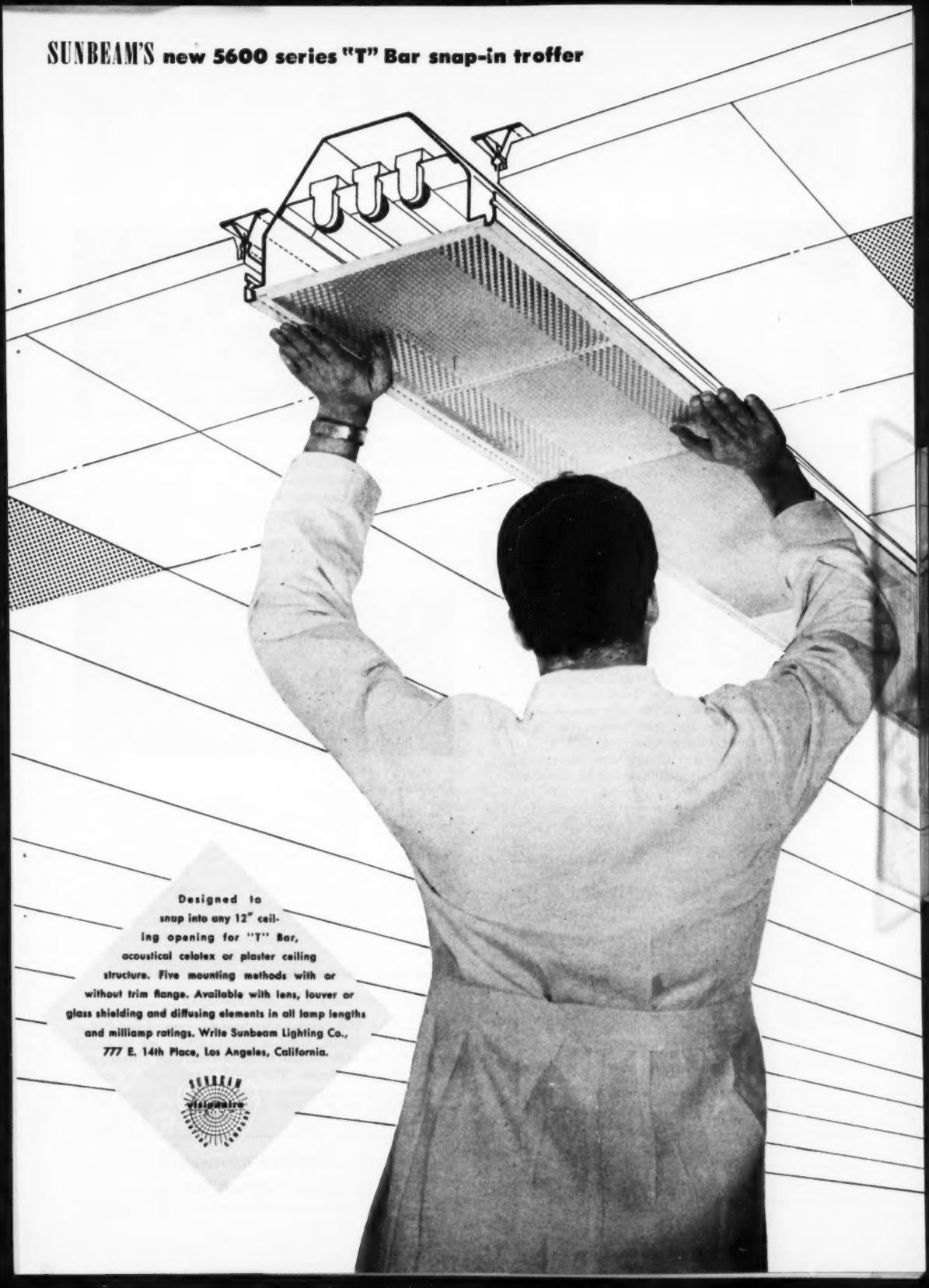
Write for Bulletin J50

G&W ELECTRIC SPECIALTY COMPANY

7780 DANTE AVENUE • CHICAGO 19, ILLINOIS, U.S.A.

Representatives in principal cities. In Canada, Powerlite Devices, Ltd., Toronto

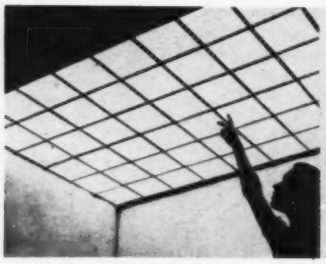
SUNBEAM'S new 5600 series "T" Bar snap-in troffer

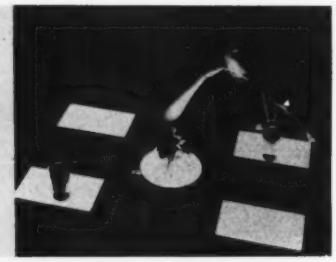


Designed to snap into any 12" ceiling opening for "T" Bar, acoustical celotex or plaster ceiling structure. Five mounting methods with or without trim flange. Available with lens, louver or glass shielding and diffusing elements in all lamp lengths and milliamp ratings. Write Sunbeam Lighting Co., 777 E. 14th Place, Los Angeles, California.

SUNBEAM
visionaire

PRODUCT NEWS





Tubeless, Bulbless Light Source Has Many Uses

(1) Sylvania Electric Products Inc., 500 Fifth Ave., New York, N. Y.

Panelite, a lighting system providing a plane instead of a point or a linear source, consists of sheets of conductive glass with a phosphor-dielectric coating and a layer of vaporized aluminum. Wires are connected to the edges of the sheet.

Panelite is commercially available at present in two types: a green luminosity of 1.0 f-l at 120 v and a green luminosity not more than 2.0 f-l when a 500-v step up is used. Both are for 60-cycle operation.

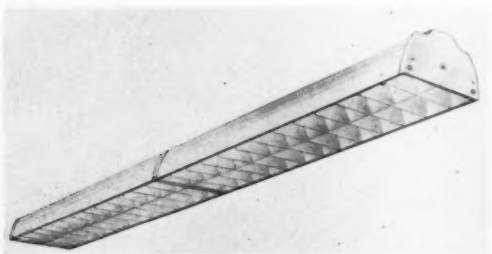
Some of the uses illustrated above are:

A luminous ceiling ⅛ in. thick and 6 ft wide is made up of Panelite squares, has a brightness of 2½ f-l, throws approximately 1½ f-c on the model shown. A small transformer brings the house current up to 500 v, but the entire ceiling uses less current than a 75-w incandescent bulb. Low-level illumination in restaurants, elevators, theater aisles is possible with this method.

A lighted night-clock face is wired from the edges of the clock face to the house current without a transformer. Panelite clock faces are being made in green; other colors are being developed.

The ⅛-in.-thick glass sheets can be set into a table top to give low-level illumination, without bulbs, tubes or light boxes. House current here is stepped up to 400 v with a toy-train-type transformer.

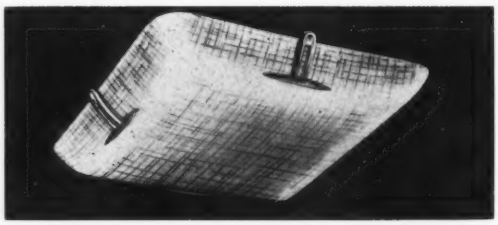
Other uses are for illuminated switchplates, commercial clocks, radio dials.



Fixture for Industrial Plants

(2) Curtis Lighting Inc., Dept S-16, 6135 W. 65th St., Chicago 38, Ill.

The 8-ft Challenger is designed for four 40-w, T-12, 48-in. fluorescent lamps. It is made of heavy-gage steel, finished in baked enamel; comes wired for 110-125 v a-c circuits, with choice of instant-start or starter-type ballasts. Listed by Underwriters' Laboratories.



Flat-to-Ceiling Fixtures

(3) Lightolier Corp., 346 Claremont Ave., Jersey City, N. J.

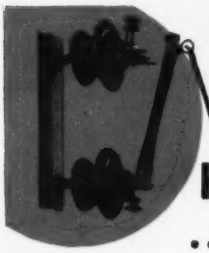
A group of 15 ceiling fixtures has been designed to complement today's wall paper and fabric textures and patterns for traditional, provincial and modern homes. The fixture illustrated is a 16-in. square of molded glass, with a linen-like texture and clasps of the colonial door knocker style. It is 16 in. deep.

Infrared Chick Brooder

(4) Steber Mfg. Co., Broadview, Ill.

Designed for 250 chicks, this brooder uses three 250-w infrared heat lamps. Heat resisting sockets are mounted in 16-in. hood with outside finish of Graytone Ultranamel and white inside finish. The hood comes with a sturdy hanger hook for suspension over brood. The unit is completely wired. Bulletin 1048 describes the brooder.

For Additional Information
Fill in the Coupon on Page 68



CHANCE

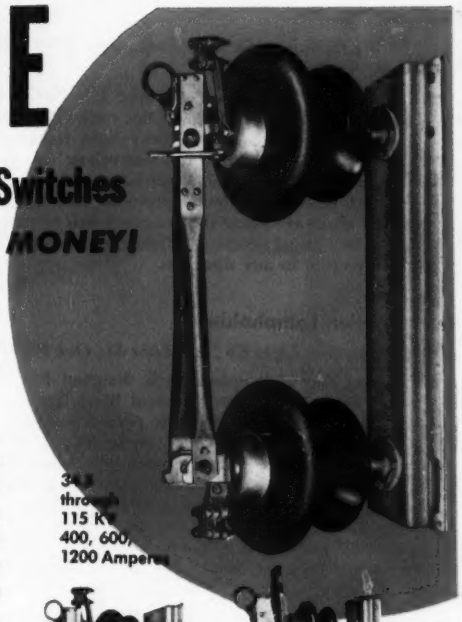
Hook Stick Disconnect Switches

... MORE FOR YOUR MONEY!

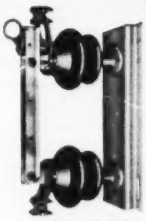
Chance Type BT Hook Stick Operated Disconnect Switches are made in a complete range of capacities for all types of single pole disconnect switch installations. They are available in single, tandem, or double throw types for horizontal mountings—upright, underhung, or vertical mountings up to 115 KV.

Dependable operation is inherent in their sturdy construction . . . RIGID CONTACT BLADES withstand heavy side thrusts, even if the closing force must be applied from an angle. Switches from 34.5 through 115 KV have a double tubular trussed blade which gives unequalled strength plus blade guides at the tongue which aid in contact alignment. 400 and 600 ampere switches rated 23 KV and below have reinforcing flanges on blades which increase rigidity and act as blade guides for closing the switch from an "out of line" position. 1200 ampere switches rated 23 KV and below have flat rigid parallel bus bar blades.

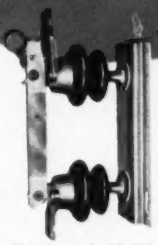
All Chance BT Switches have flanged bases that will not cut into wood supporting structures. Each size has been tested in accordance with A. I. E. E.-NEMA standards. Heat runs, high current tests, icing tests, insulation characteristics and life tests have proven the reliability of Chance Type BT Switches under all normal conditions.



34.5 through 115 KV 400, 600, 1200 Amperes



7.5 through 23 KV 400, 600 Amperes

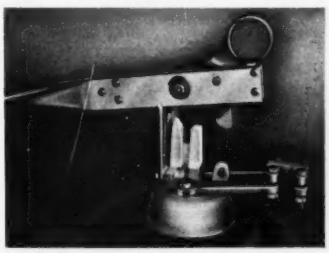


7.5 through 23 KV 1200 Amperes

Powerful Pryout for EASY OPERATION

A powerful lever action has been built into the pull ring mechanism and enables the operator to break ice or overcome clip adhesions with ease. All 400 and 600 ampere switches are equipped with time-saving built-in universal terminals. 1200 ampere switches have NEMA standard 4 hole terminal pads. Terminal lugs will be furnished on request.

Pressure Centered LONG LIFE Contacts



Pressure at the clip end is created by a conical compression spring combined with spherical washers. Split Tongue Contact casting "centers" spring pressure directly over contact area. All contacts are heavily silver plated on 1200 ampere switches. Lower ampere switches can be furnished with silver to silver or copper to copper contacts.

abc INDUSTRIES

You know it's RIGHT when you specify CHANCE

A. B. CHANCE CO.

CENTRALIA, MISSOURI • SAN FRANCISCO, CALIFORNIA

Runway Light

(5) Westinghouse Electric Corp., Box 2099, Pittsburgh, 30, Pa.

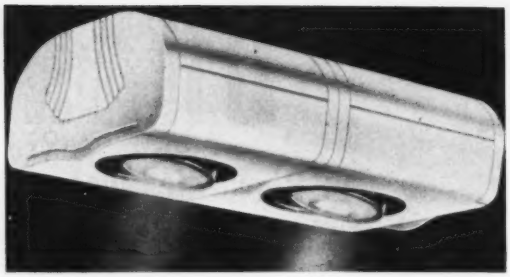
A new high-intensity runway light, type US, directs two main beams of light up and down the runway. Its one-piece 360° glass lens gives off-runway light for circling guidance. Available with clear, clear-yellow or green lenses for runway and threshold markings, the light uses a 200-w, 6.6-amp, T-14 bulb, prefocus base aviation lamp. Color filters are inside the one-piece lens to prevent breakage. The optical system is adjustable up to five degrees from vertical in any direction.

Spring Action Lampholder

(6) Guardian Light Co., 301 Lake St., Oak Park, Ill.

An improved line of lampholders is designed for 150-, 300- and 500-w sealed-beam spot and flood lamps, and features a spring-action socket said to permit positive electrical contact, snug fit of lamp to lampholder rim and to prevent lamp breakage from temperature changes or minor physical variations. Lampholders are of cast aluminum, come completely wired and in two sizes. One model takes the 150-w PAR-38 lamp, the other is for use with the R-40, 300- and 500-w mogul-base lamps or medium-base lamp with adapter. Both have a stem with ½ in. tapered thread.

For bulletins, fill in coupon on page 68



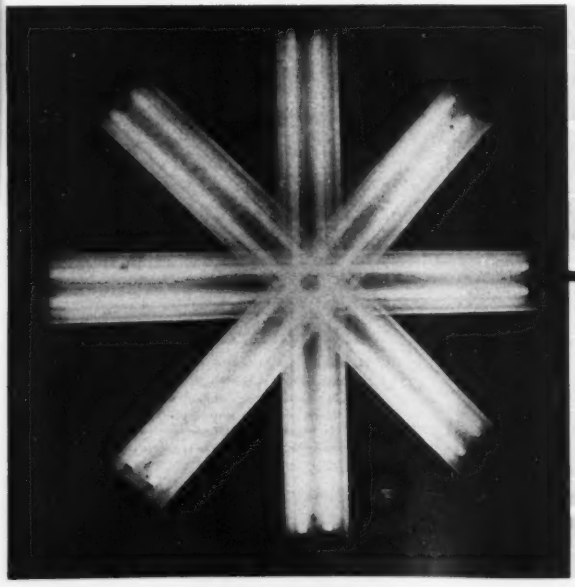
(7) Model 361 spotlight is designed for in-line mounting with Mitchell Mid-Century commercial fluorescent luminaires or for individual mounting in any lighting system. It gives down-punch lighting for merchandise display and accent illumination. Made by Mitchell Mfg. Co., 2525 Clybourn Ave., Chicago, Ill.

Reflector

(8) Abolite Lighting Division, The Jones Metal Products Co., West Lafayette, Ohio

The new Protecto reflector, the GBF unit, is for industrial and commercial applications. It was designed in cooperation with General Electric lighting engineers for use with the new G-E high-bay lamp R-52. Reflector and neck are of one-piece construction and seven mounting styles are available. The unit is made of porcelain enamel on steel with a standard outside green finish and white porcelain enamel inside finish.

your assurance of ACCURATE luminaire design—
latest photometric methods at All-Brite's own testing labs



During development stages, advanced scientific techniques and equipment are utilized in pretesting and checking All-Brite luminaire design. *Results are confirmed by independent nationally recognized laboratories.*

fluorescent fixtures of california

san francisco
3320 - 18TH STREET

los angeles
613 IMPERIAL STREET

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1318 S. W. FIRST AVE.

ORIGINATORS OF **FLUORESCENT WESTERN CONTEMPORARY** LUMINAIRES

All-Brite
LIGHT OF THE WEST

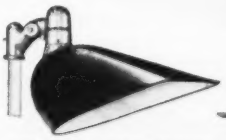
The wall that can't be climbed!

A wall of brilliant light is a barrier no intruder can scale, no prowler can penetrate without exposure. Today, more than ever, this screen of protective lighting is a vital security measure, especially for plants engaged in defense work.

Appleton Floodlights are scientifically designed to guard industrial properties, while providing the good light necessary for best working conditions. The Elipso Standlite, for instance, rings your plant facilities with a broad band of illumination when properly spaced along a fence line or mounted on buildings.

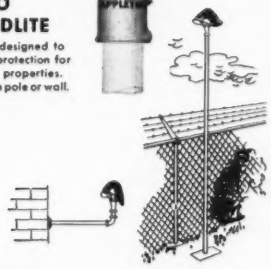
For fixtures that meet every industrial requirement—including hazardous locations—whether indoors or out, contact Appleton, pace-setting manufacturer of electrical equipment for nearly half a century.

ELIPSO STANDLITE
Expertly designed to provide protection for industrial properties. Mounts on pole or wall.



DIFFUSO FLOODLIGHT
For even illumination of service stations, athletic fields, parking lots, etc. Pole, bracket or crossarm mounting.

SPORTO
For high intensity illumination over large areas. Weather-proof hood allows for complete vertical or lateral positioning. Pole, bracket or crossarm mounting.



APPLETON Floodlights

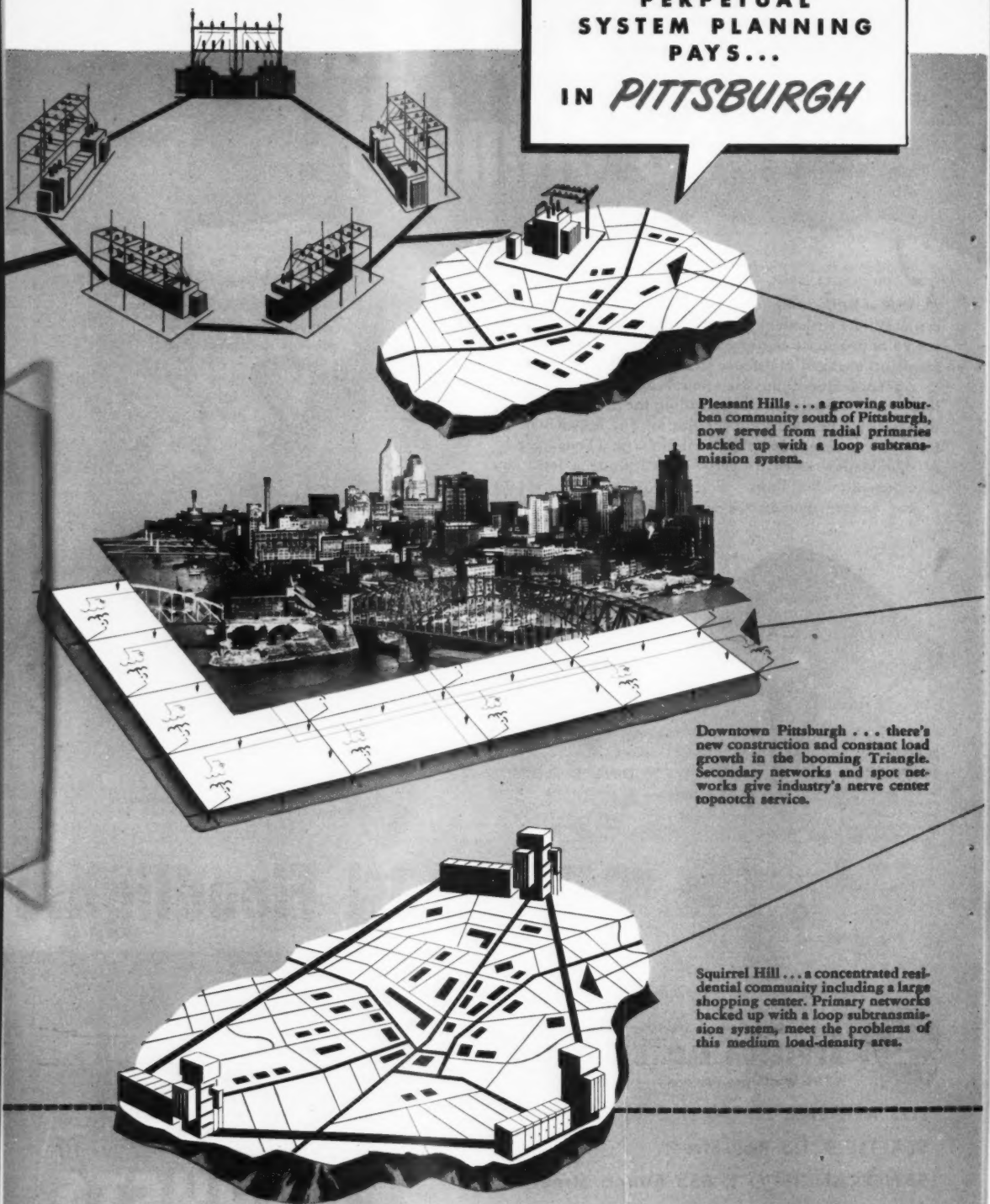
Sold Through Electrical Wholesalers

APPLETON ELECTRIC COMPANY
1709 Wellington Avenue • Chicago 13, Illinois

LOS ANGELES 12, 100 N. Santa Fe Avenue
SEATTLE 9, 115 Ray Street
SAN FRANCISCO 1, 655 Minna Street
DENVER 2, 1921 Blake Street

MALLEABLE IRON CONDUIT FITTINGS
APPLETON
OUTLET BOXES AND SWITCH BOXES
ELECTRIC
AND STREET LIGHTING EQUIPMENT
PRODUCTS
EXPLOSION-PROOF FITTINGS AND BOXES

PERPETUAL SYSTEM PLANNING PAYS... IN *PITTSBURGH*



Pleasant Hills . . . a growing suburban community south of Pittsburgh, now served from radial primaries backed up with a loop subtransmission system.

Downtown Pittsburgh . . . there's new construction and constant load growth in the booming Triangle. Secondary networks and spot networks give industry's nerve center topnotch service.

Squirrel Hill . . . a concentrated residential community including a large shopping center. Primary networks backed up with a loop subtransmission system, meet the problems of this medium load-density area.

"Simplified Systems

meet our load growth...
reduce distribution costs"

In Pittsburgh you'll find all the benefits from almost 30 years of sound system planning. Main benefit—complete flexibility to meet all load growth economically.

Duquesne Light Company take full advantage of the latest advances in the design and reliability of modern unitized electrical apparatus. Small blocks of power are integrated to improve their own unique Service Continuity Standards without uprooting the entire system.

CASE I Greatly increased load with subsequent voltage problems necessitated improved service continuity and the elimination of line losses for this suburban area. Proper system planning utilized a nearby subtransmission loop by installing a unit-type single-feeder substation. Pleasant Hills gets adequate service and costly field-erected substations are eliminated.

CASE II Secondary networks have provided Pittsburgh's Triangle with the highest quality of service since 1926. Badly congested primary feeders and small transformer installations were eliminated. Duquesne Light Company also offers the spot network form of the system for large commercial buildings. Sound planning enabled Pittsburgh to grow without any basic changes in the system.

CASE III 4 kv primary networks were installed in 1949 to economically meet the Service Continuity Standards for this medium load-density area. Careful planning based on load growth, income potential and geographic conditions dictated the necessity for a primary network system. Now, service continuity is high and there's complete flexibility to meet any increase or change in load density.

BECAUSE OF SOUND PLANNING, systems have been simplified, small blocks of power integrated, high service standards maintained, power distribution costs reduced. Westinghouse equipment and co-ordinated distribution apparatus have contributed to the ease and speed of change-over, dependability, and economy of this model operation. Use Westinghouse as your planning partner. Call us when you're ready to modernize. Start modern planning now!

J-97134

YOU CAN BE SURE.. IF IT'S

Westinghouse

SYSTEM PLANNING SERVICE

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver.

MORE UNION
PIN TYPE SOCKETS
SOLD *than all other makes combined!*

The First!
The Best!
No. 43308 & 43318 MEDIUM BASE
No. 44408 INTERMEDIATE BASE
No. 44418 INTERMEDIATE BASE
No. 11108 CANDELABRA BASE
COMPLETE STREAMER LINE FOR ALL OUTDOOR LIGHTING

Ever Ready Pin Type Sockets offer the most convenient and economical means of obtaining outdoor or indoor temporary lighting, since the tedious stripping, soldering and taping operations are eliminated.

In street decoration, construction lighting, carnivals, roadside stands, etc., their ease of installation and convenient flexibility is unsurpassed.

Insist on UNION'S PIN TYPE SOCKETS — the FIRST and the BEST.

UNION
INSULATING CO.
PARKERSBURG, W. VA.

Mercury-Vapor Lamp

(9) Westinghouse Electric Corp., Lamp Division, Bloomfield, N. J.

The 400-w J-H1 fluorescent mercury-vapor lamp is designed to give a whiter light. The bulb has an inside coat of a phosphor that fluoresces red when activated by invisible ultraviolet light generated by the quartz arc. The BT-37 bulb has an isothermal shape that gives an even operating temperature over the bulb wall and the lamp will burn in any position. It can be used in existing fixtures for 400-w mercury lamps.

Lower brightness makes operation at lower mounting heights practical, the manufacturer states. Increased fixture efficiency is obtained by removing the diffusing shield frequently used with the A-H1 type, it is claimed. Electrically similar to the 400-w A-H1 and E-H1 types, the J-H1 will operate from H-1 ballasts.

The lamp can be used for industrial purposes and for flood and street lighting. When used outdoors, fixtures should be enclosed to prevent cracking the glass bulb.

Industrial Fluorescent Line

(10) Mitchell Mfg. Co., 2525 Clybourn Ave., Chicago, Ill.

Eighty-two fluorescent fixtures for industrial installations make up the Dynalite line. Featured are two- and four-lamp, 40-w medium bipin units, two- and four-lamp twin-turret units and three- and six-lamp 40-w triple-turret units, in 4-ft, 8-ft tandem and 8-ft combination lengths. Body channels are 20-gage steel, of one-piece construction. Fixtures come completely wired and can be chain-, conduit- or stem-mounted individually or in continuous rows. Reflectors are available in RLM porcelain or baked enamel.

Lighting Control

(11) Weston Electrical Instrument Corp., 641 Frelinghuysen Ave., Newark 5, N. J.

Model 1089 gives automatic on-off control of artificial lighting at predetermined light levels. It is mounted in a standard weatherproof watt-hour meter glass case and is installed by plugging into a standard watt-hour meter receptacle. It consists of a stable dry-disc type photocell, a sensitive relay operated directly by the photocell, a clock motor, mercury switch and limit switch.

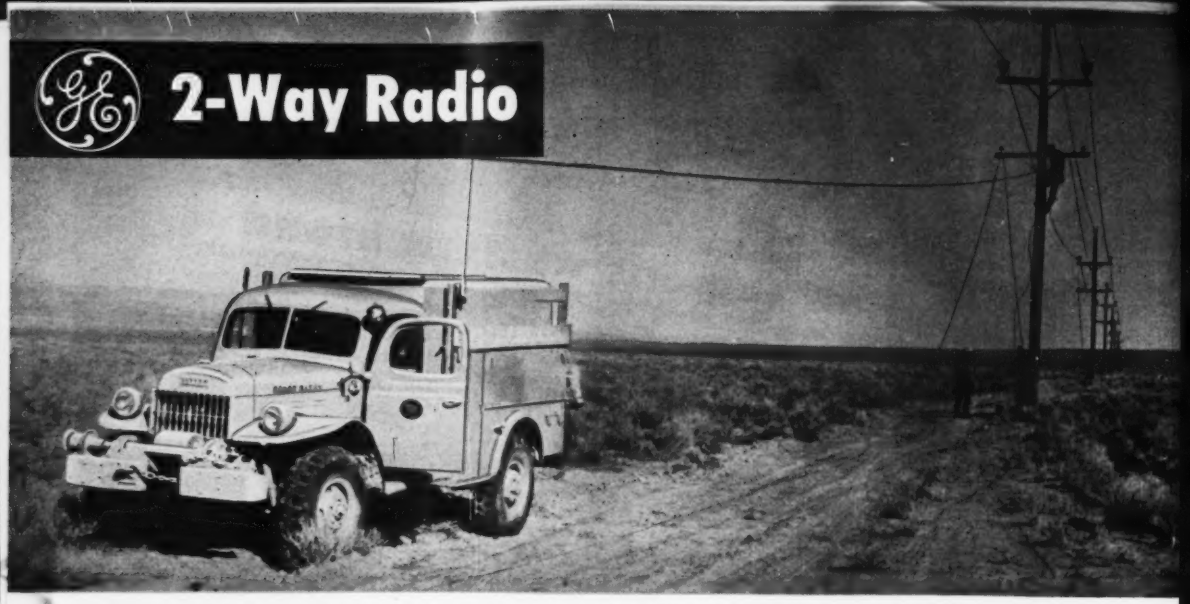
(12) L-M Spherolite and Fresnelite luminaires provide a variety of light patterns for protective lighting. The Spherolite gives IES light patterns, type 1 through 5, and is for use with incandescent lamps up to 575 w on multiple circuits or 10,000 lumens on series circuits. With no basic changes or additions it will accommodate 11,000-, 15,000- or 20,000-lumen vertical-position MV lamps. The Fresnelite projects a wide, flat beam for considerable distance; was designed for glare lighting of outer fence areas. Special luminaires for rare conditions and control equipment for all sizes and types of protective lighting are available also from the manufacturer, Line Material Co., Milwaukee, Wis.

(13) **FLUORESCENT COLORS**—An improved fluorescent lamp claimed to have an increased lumen output per watt has been announced by the Duro-Test Corp., North Bergen, N. J. Candelite, originally rated at 51 lumens per watt on the 40-w lamp, is now rated at 60 lumens per watt. Vis-A-Ray, formerly rated at 58 lumens per watt, is now rated at 63 lumens per watt.

(14) **CONVERSION KIT**—Ordinary lamps can be converted to 3-way lamps with the Improv-a-Lite conversion kit offered by Monowatt Inc., 66 Bissell St., Providence, R. I. The kit consists of a factory-wired 3-way socket, new wide harp, 8-ft extension cord and a clamp-on plug. This kit is listed under the Reexamination Service of Underwriters' Laboratories.

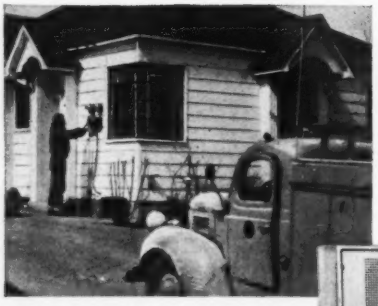
Another famous western brand
The West's accepted brand of quality in lighting equipment! Look for this mark of excellence in meeting your lighting needs. Smoot-Holman illumination is distinguished by outstanding design, superior construction and economical performance in commercial, industrial and institutional uses.
ILLUMINATION EQUIPMENT
SMOOT-HOLMAN
INGLEWOOD, CALIFORNIA
MADE IN U.S.A.
SMOOT-HOLMAN COMPANY Inglewood, Calif. Offices in Principal Western Cities • Branch and Warehouse in San Francisco

2-Way Radio



Underbuilding circuit on existing line in desert country. This service truck and crew are 30 miles northeast of Sierra's base station at Lovelock. Mobile receiver on truck is open continuously to pick up possible emergency calls to other parts of district. Battery drain is held at minimum by switching off transmitter filaments. Value of radio communication increases wherever topography or weather make land line maintenance difficult.

Radio trims miles-Saves hours-



Homes get quick service when trouble trucks are dispatched by radio. More calls per day with same gasoline consumption cuts fleet costs.

SIERRA PACIFIC POWER CO.

At Reno headquarters, service center director Lauritz Lund operates well-ordered communications system, controls 8 base stations and 50 mobile units in 15 counties.

▲ **Six rich valleys** of valuable farm and ranch land comprise Sierra's southern area. Ranch customers are pleased with prompt service typified by Bob Shannon (above) dispatching line trucks from Carson City.

Historic Donner Pass forms background behind division superintendent in radio car. Sierra's 3 most important transmission lines cross this pass and year-round communication is vital. Note 120 kv structure at right.

Extending 300 miles to the horizon, Sierra substations and sub-transmission lines cover rough mountain-desert terrain. Base station at Lovelock is 100 miles from this truck, but General Electric FM beam rides above static, delivers clear signal.

Line fault repairs in Carson Valley are completed by crew summoned via radio. 60' antenna (left) beams signals to trucks as far away as 110 miles.

to serve rugged mountain area!

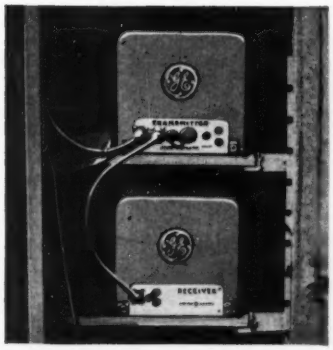
Sierra Pacific's mobile radio system ties together vast 15-county operation

To get more customer service per mile from its trucks and cars, this western utility makes profitable use of the latest in General Electric 2-way radio equipment. With eight base stations and 50 mobile units scattered over 15 counties, communication across rough terrain is no longer a problem.

Utility management knows the value of rapid servicing to hold customer satisfaction and cut line maintenance costs. Fast service demands fast communication, and G-E engineers are specialists at public service communication problems.

ASK YOUR G-E COMMUNICATIONS MAN

He has complete case history facts on what this equipment has done for other utilities. Why not let him show you how it can help your company? There's no obligation. Call the G-E office in your city or write us: *General Electric Company, Section 2091, Electronics Park, Syracuse, New York.*



Quality components are standard in G-E equipment. Mobile units shown are mounted in special compartment of service truck.

You can put your confidence in—

GENERAL ELECTRIC

Improved....

Series 63300 B

FISHER-PIERCE

PHOTOELECTRIC CONTROL

FOR STREET LIGHTING

This new Fisher-Pierce Control is the result of long experience in design and manufacture, combined with practical experience of more than 600 electric utilities in more than 20,000 installations.

The new 63300 B Control is mechanically and electrically interchangeable with existing controls. The same dependable Fisher-Pierce circuit, consistently giving tube life of more than 20,000 hours, has been retained. Improved spacing and insulation provides increased protection against lightning damage . . . up to 2500 volts rms Hipot. Mechanical design has been altered to provide maximum simplicity for greater economy of servicing.

New Address

The FISHER-PIERCE Co., Inc.

43 PEARL STREET, SOUTH BRAINTREE, BOSTON 85, MASS.

Spotlight

(15) Stonco Electric Products Co., 489 Henry St., Elizabeth 4, N. J.

An outdoor spotlight gives 100,000 candlepower with a 300-w rating; is designed to concentrate its entire light output in a long-throw, oval-shaped, narrow beam. It is made of noncorrosive, heavy-duty cast aluminum and has an adjustable cast-aluminum swivel arm threaded ½ in. NPT. Five units can be mounted in a single cluster light assembly. Wiring is completely enclosed. Underwriters' approved.

Service Station Light

(16) Guardian Light Co., 201 Lake St., Oak Park, Ill.

This fixture is mounted in a horizontal position to direct the light from its six 40-w fluorescent lamps downward. The T light is said to give high intensity output of low surface brightness. It has instant-start ballasts and lamps, is Underwriters' listed. Comes completely wired. Lamps are included.

Specialty Lamps

(17) Mitchell Mfg. Co., 2525 Clybourn Ave., Chicago, Ill.

Such items as pin-ups, study lamps, bed lamps, concealed lights for television viewing are included in the Giftline group being offered by this manufacturer. The line includes 22 models.

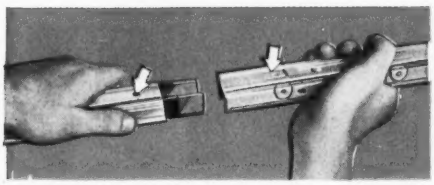
(18) ADAPTER—A lighting fixture that screws into the ceiling socket to cover bare lamp bulbs is offered by Moe Light Inc., Fort Atkinson, Wis. Called the MOE-dapter; the line includes glass-bowl, lantern or shade, pan and fluorescent-tube types.

(19) UV LAMP—A line of high-intensity long-wave ultraviolet lamps for observing fluorescence is manufactured by Ultra-Violet Products Inc., South Pasadena, Calif. Designed for defense purposes and applicable to industrial inspection and laboratory analysis, Blak-Ray lamps are Underwriters' approved. They have a self-filtering black-light-blue tube that allows the long-wave ultraviolet rays to pass through but filters out the undesirable rays in the visible portion of the spectrum. No additional filters are required, according to the manufacturer. The tubes will last for 2,000-3,000 hours, come in 4-, 8-, 15-, 30-, 40- and 80-w sizes. The unit weighs 1¾ lb; has over-all dimensions of 3¼x4x6½ in.

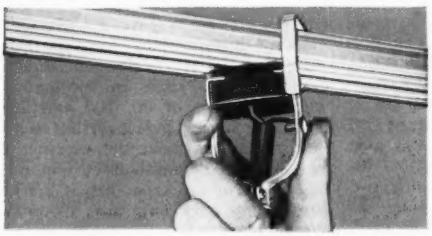
(20) EMERGENCY LAMP—An automatic emergency hand lamp that plugs into any 110-v a-c wall outlet is made by Electric Cord Co., 195 William St., New York 38. An adjustable flood-type head is designed to fit Burgess 7½-v battery or equal.

Flexible lighting system that can be easily changed without rewiring

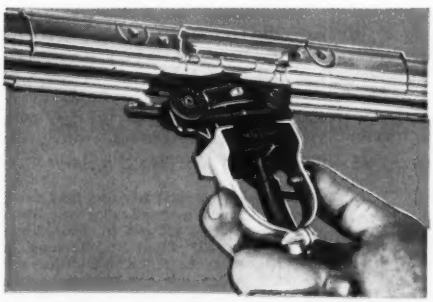
Move or add lights *anytime, anywhere* with BullDog Universal Trol-E-Duct



Duct sections are joined without tools, nuts or screws. Prefabricated and standardized in lengths from one to ten feet, they can be dismantled and reinstalled anytime, anywhere without scrapping a single part.



To tap off power at any point along the slot, simply insert twist-out plug and give it a 90° turn. Plugs are grounded on steel casing before contacts touch bus bars; narrow-access slot protects operator.



Trolley-type outlets are used where mobility is a prime requisite—such as for small portable tools or for drop-cord lighting in stock bins and inspection areas.

Safe, simple, quick! Tap off power from totally enclosed bus bars *at any point* along the continuously slotted duct with handy trolleys or twist-out plugs. Universal Trol-E-Duct both supports and supplies current to these fluorescent lighting fixtures.

Meet changing conditions quickly, economically with this truly flexible lighting system.

To move or add lights, simply pick the right spot and insert handy twist-out plug or trolley. Every inch of this money-saving 50-ampere duct system is a tap-off! Prefabricated and standardized in lengths from one to ten feet, it can be dismantled and moved to a new location without scrapping a single part.

Call in your nearby BullDog Field Engineer for more information about this modern lighting system. He will be glad to show you an installation near your own office. Or write BullDog direct for descriptive literature.

BULLDOG ELECTRIC PRODUCTS COMPANY

DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES

IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO

BULLDOG

HEADQUARTERS FOR ELECTRICAL DISTRIBUTION

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Coast Electric & Manufacturing Co.
1720 N.E. Sixth Avenue Tel. Tuxedo 5191
Portland 12, Oregon

Safety Switchboard Company
1445 Stevenson Street Tel. Hemlock 1-2470
San Francisco 3, Calif.

Paul L. Mullenbach Co.
3008 E. Olympic Blvd. Tel. Angelus 9-8101
Los Angeles 23, Calif.

TAILOR-MAKE YOUR OWN

CONDUIT OR PIPE BENDS

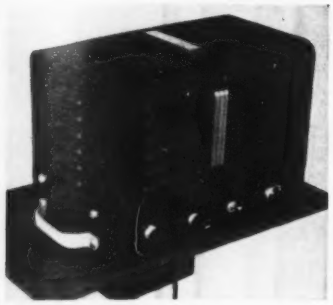
RIGHT ON THE JOB

...simple, quick with the GREENLEE HYDRAULIC BENDER

Yes, quickly make bends *exactly* as you want them, when you want them, where you want them. Compact, portable GREENLEE Hydraulic Pipe and Conduit Bender lets you do this in a jiffy. *One-man operated* to produce smooth, accurate bends in just a few minutes . . . in pipe up to 5", rigid and thin-wall conduit, tubing, bus-bars. Owners report timesavings up to 60% and more, elimination of cost for manufactured bends and fittings, and "clean", tailor-made installations every time. Get facts now on this time-saving tool that often pays for itself on first few jobs! Write for free Bender Booklet, Greenlee Tool Co., 1769 Columbia Avenue, Rockford, Illinois.

GREENLEE

Other GREENLEE timesaving tools for electrical work: Hand Benders; Joist Borers; Cable Pullers; Knockout Tools; Auger Bits and Drills.



Alarm

(21) Dondar Devices, P. O. Box 187, La Canada, Calif.

An electronic control guards home, office or store by setting off an alarm and turning on lights when protected objects are approached. The alarm operates continuously or at intervals as desired. Unit operates on 120 v a-c, 60 cycles. A small wire from unit to screens, doors or near objects to be protected is the only attachment.

Model 100 is sensitive when a body approaches up to 4 ft; can be used also to turn on lights, open garage doors or to signal approach. For small house or store protection, this model will handle several ordinary window screens with up to 60 ft of connecting wire. Anyone touching screen or wire will set off alarm. Circuit can be set to remain closed until turned off manually; otherwise it opens as soon as object moves away.

Model 101 is designed with two separate input circuits, doubling the amount of antenna that can be used. Approximate power consumption "at ready" is 20 w; relay output capacity, 10 amp; noninductive load, 120 v a-c, 60 cycles. The 120-v outlet on unit will handle 1,000 w of lights and terminals are provided for 4 amp at 10 v for bell buzzer or relay. An adjustable time delay feature is provided. Output can be set to remain on several minutes, then turn off automatically; or control can be set to remain on until manually turned off.

Noise Meter

(22) Hermon Hosmer Scott Inc., 385 Putnam Ave., Cambridge 39, Mass.

An improved type 410-B meter has been announced for measuring noise, sound and vibration. The new model features greater low-frequency range and electrical circuit and mechanical improvements. Sound level range is from 34 to 140 db above the standard ASA reference level of 0.0002 dynes per square centimeter. Hearing aid batteries have an operating life of about 50 hours.

For bulletins, fill in coupon on page 68

Fuse Cutouts

(23) Line Material Co., Milwaukee 1, Wis.

A line of 5,000-v primary fuse cutouts has been designed for high fault current capacity distribution feeders. These cutouts come in continuous-current ratings of 50, 100 and 200 amp, are said to give high interrupting capacity without the expense of needless high, continuous-current rating. Interrupting capacities at 2.5 kv are 50 amp, 8,000 amp rms; 100 amp, 14,000 amp rms; 200 amp, 20,000 amp rms. Interrupting capacities at 5 kv: 50 amp, 5,000 amp rms; 100 amp, 10,000 amp rms; 200 amp, 15,000 amp rms.

Heavy-duty cutout doors with fuse cartridges are available separately and are interchangeable with doors presently used on L-M 50- and 100-amp PVD outlets. The doors are also available with switch blades for easy conversion to a disconnect switch, the manufacturer states.

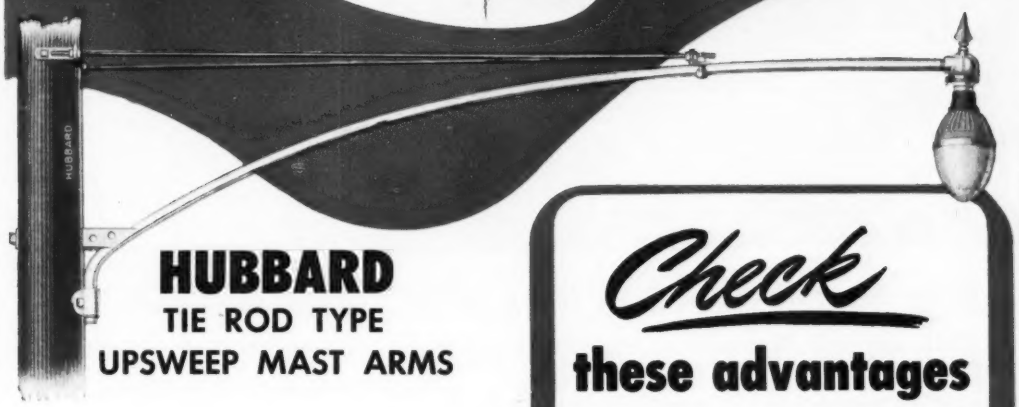
(24) RELAY—A new low-cost time delay relay utilizing a hydraulic-magnetic operating principle is offered by Heinemann Electric Co., 327 Plum St., Trenton 2, N. J. Known as the Silic-O-Netic time delay relay, it has only one moving part in the time element, which is hermetically sealed and never needs attention, according to the manufacturer. Over-all dimensions are 1⅜x2¼x¾ in.; rated capacity is 10 amp at 120 v, a-c. Available with timings up to four minutes.

(25) FAN—A 30-in. window fan that will cool four to six rooms at a time has been announced by Robbins & Myers Inc., Box 2527-A, Memphis 2, Tenn.

beauty

efficiency

strength



HUBBARD
TIE ROD TYPE UPSWEEP MAST ARMS

THE HUBBARD Tie Rod Mast Arm, with the famous Hubbard Keyhole design, is made in lengths of 8, 10, 12, and 14 feet, is easily installed, is well braced against side sway, and has the strength to support an extremely heavy vertical load. The ⅜-inch tie rods have 6-inches of thread at each end to allow for irregularities of mounting.

The 1¼-inch pipe will accommodate two-conductor No. 8, 6000 volt cable. Internal wiring is easy, for there are no angles, sharp bends, or obstructions.

Write for Literature

Check these advantages

- Exceptional strength . . . tie rods fastened to side of pole to minimize "sway."
- Design permits maximum elevation of luminaire.
- Meets all current strength and design requirements.
- Graceful simplicity—light weight—low cost.
- "Free-flowing" internal wiring—beveled pipe ends—no sharp bends—no obstructions.

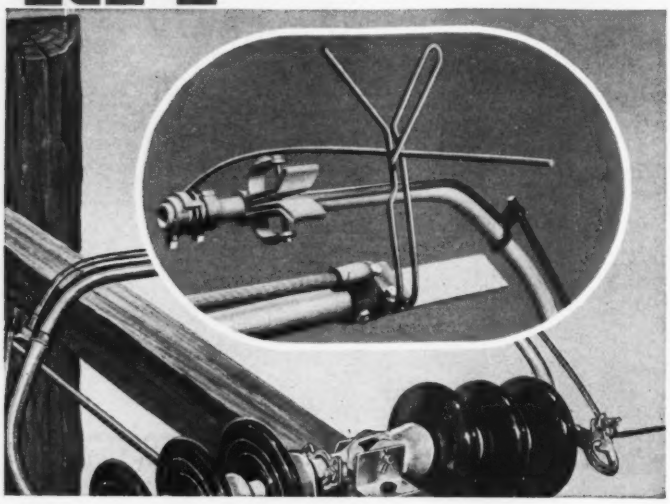
HUBBARD AND COMPANY

ESTABLISHED 1843

PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA

"Hang the Load on Hubbard Hardware!"

KPF POLE TOP SWITCHES



Drop 40 miles of 69 kv lines with KPF Quick-Break pole top switch

Operating engineers tell us KPF switches with Quick-Break attachment are the most outstanding air-break switch improvement in 25 years. Before development of this Quick-Break device, pole top switching of 69 kv circuits was limited to some 6 miles of line. Now, operating experience shows that 40 miles of 69 kv line can safely be dropped with this equipment.

The secret of the KPF Quick-Break is a heavy-duty cat's whisker which whips free in a split second as the switch is opened. This mechanism prevents establishment of an arc; thus critical arc length is no problem.

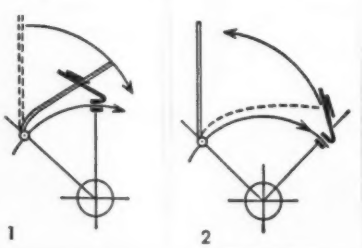
The KPF Quick-Break attachment is simply and ruggedly constructed for low cost, long life and all-weather dependability. It is available for all KPF switches rated 15 to 69 kv.

HERE'S HOW KPF QUICK-BREAK WORKS

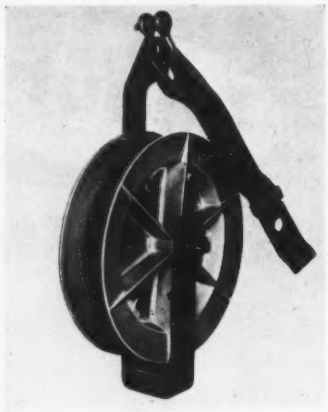
1. Spring rod winds to full tension as switch opens.

2. Rod springs clear, breaking contact at high speed.

Write for details of KPF Quick-Break attachment and low cost, long-lasting, easy-to-install KPF Switches.



KPF ELECTRIC COMPANY
1624 E. Alpine Avenue • Stockton, California



Stringing Blocks

(26) Distribution and Hi-Line Specialties Co., 2100 Del Norte, St. Louis 17, Mo.

Universal stringing blocks with rubber-lined sheave groove are offered for large transmission conductor, aerial cable, distribution wire, signal control circuits, heavy communication cables. No. 100 and 1,000 have a ⅜-in.-thick rubber-lined sheave groove for cushioning important cables and conductors while stringing. No. 100 has centering support that prevents hinge type collapse when unloading. No. 1,000, No. 10 and No. 5 are described as rugged, double-shackle types that provide extra flexing while stringing.

Insulation

(27) Johns-Manville, 22 E. 40th St., New York 16, N. Y.

Quinterra 3, an asbestos-base, silicone-treated, high-temperature insulation, is used for both inter-layer and wire wrapping insulation.

Advantages claimed are savings on materials, greater safety factor and opportunity for more compact design.

It maintains a dielectric strength of at least 350 VPM under continuous exposure to Class H maximum temperature of 180 C. Dielectric strength is said to remain practically constant even under continuously high humidity.

The insulation comes in sheets, rolls and tapes; widths can vary from ¼ to 36 in. and will be factory cut to specification. Available thicknesses are from 3 to 9 mils.

(28) SWITCH—The DU. OP switch for use in applications requiring a compact, light-weight, long-life limit switch has been announced by General Control Co., Boston 37, Mass. The switch is said to have no inherent bounce, no operating motion contact delay, less a-c peak temperature rise.

Defense Production

makes more important than ever the Specification of Lighting Units that meet

RLM High Quality Standards

for Efficiency, Durability and Uniformity

Vital to defense and essential civilian production, are lighting units that *can be depended upon* to provide the right quantity and quality of light, economically, dependably and with a minimum of servicing need and maintenance cost.

Defense production demands lighting equipment with the ability to *sustain its rated light output* efficiency over hundreds of cleanings so that the proper high illumination levels may be maintained. It demands the *durability* found so essential to industrial lighting and the avoidance of production interruptions and inefficiency due to abnormal wear, distortion or breakdown. It demands fullest *protection from glare* through proper diffusion and shielding.

All of these, and many other conditions for proper lighting of defense plants can be met through the specification of RLM-Labeled Lighting Units. All units bearing the RLM Label are warranted by Electrical Testing Laboratories to conform to the minimum standards established by the RLM Standards Institute for efficiency, durability and uniform quality.

FREE RLM BOOKLETS containing complete specifications for all RLM-Certified Industrial Fluorescent and Incandescent Lighting Units and the names of all manufacturers of RLM-Labeled Units may be obtained by writing: RLM STANDARDS INSTITUTE INC., Suite 815, 326 West Madison Street, Chicago 6, Illinois.

Specification of RLM-Labeled Units Assures Conformance to ALL these Essentials of Defense Production Lighting

DIFFUSION WITH HIGH REFLECTION FACTOR
RLM Porcelain-Enameled Steel Reflectors must have a mean reflection factor of 82% . . . an assurance of more light for the money. Porcelain enamel reflecting surfaces *diffuse* light from the lamp and help provide proper *quality* of illumination.

TOP QUALITY PORCELAIN-ENAMELED REFLECTORS
RLM Reflectors are built of not less than .032" reflector steel covered with .025" fused on porcelain enamel that will not chip, corrode or deteriorate under industrial operating conditions.

APPROVED REFLECTOR DESIGN
Reflector design of RLM Units conforms to specifications embodying approved practices of illuminating engineering.

HIGH POWER FACTOR BALLASTS
RLM Standards specify the use of certified ballasts which last longer, because they are designed to prevent excessively high temperature operation.

UNIFORM QUALITY
RLM Standards insist on the maintenance of uniform quality as to materials and construction, thus assuring the buyer of uniform lighting performance from each unit installed.

RLM STANDARDS INSTITUTE
INCORPORATED

The letters RLM stand for Reflector and Lighting Equipment Manufacturers

Revere
ELECTRIC MFG. CO. CHICAGO, U.S.A.
DESIGN LEADERS IN Lighting

WHITE-WAY PYLON-LITES are a REVERE CREATION for Street and Boulevard Lighting

AREA AND CLUSTER LIGHTS

750—1000 1500 WATT Enclosed Flood for Long Range Lighting

No. 4200

No. 3800 ELIPTOR For a wide range of outdoor lighting applications

WE MANUFACTURE A COMPLETE LINE OF AIRPORT FLOODS

RUNWAY MARKERS ALL APPROVED TYPES

HINGED POLES FOR STREET, PARKING LOT & SERVICE STATION LIGHTING

Write for literature

REVERE ELECTRIC MFG. CO.

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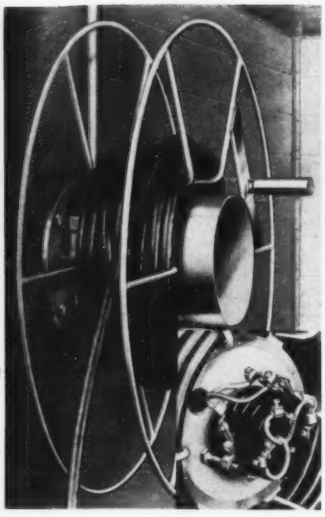
STOCKED BY L. M. BAXTER & CO.
SAN FRANCISCO—SEATTLE—PORTLAND
LOS ANGELES REP.: BRACKEN SALES AGENCY



Reel

(29) Industrial Electrical Works, Dept. 20, 1511 Chicago St., Omaha, Neb.

A Powereel for permanent mounting in trucks, on walls, etc., is offered for heavy electrical cable. The reel has a special mounting flange on the side for fastening to a base with four ⅜-in. bolts. The flange is threaded to fit a 1-in. iron conduit or give a watertight connection for flexible feeder cables.

Sizes to No. 4 four-conductor cable are accommodated. A collector ring assembly is standard to avoid interruption in current during winding or unwinding. The reel is available in any size with a 75-amp collector ring for 2, 3 or 4 conductors, or a 30-amp collector ring for up to 16 conductors.

(30) **SWITCH**—The Edco delayed-action light switch looks and is operated very much like the conventional type, but when the toggle is snapped to the off position, labeled "delay," the light stays on for almost one minute. This automatic action is secured through a patented principle involving a special spring-loaded neoprene diaphragm operating in a sealed aluminum chamber containing a vacuum. Separate snaps are heard when the switch is turned off and when the light goes out. The switch is Underwriters' approved and may be installed in any existing wall outlet or in new construction, according to its manufacturer, Electric Deodorizer Corp., 9993 Broadstreet, Detroit 4, Mich.

(31) **COATINGS**—Liquids applied by brush, spray, dip or roller dry to form a rubber-like film claimed to adhere to all types of surface. The films are durable, corrosion resisting and have high dielectric strength, according to the manufacturer, Magic Chemical Co., 121 Crescent St., Brockton, 2, Mass.

FLUORESCENT FIXTURE PERFORMANCE DEPENDS ON BALLAST QUALITY

SOLA Sequenstart
CONSTANT VOLTAGE BALLASTS
operate with
minimum ballast maintenance

They are designed to last the life of the fixture.

SOLA Ballasts are designed to be installed in a fluorescent fixture and then forgotten. Capacitor heat failure (principle cause of ballast malfunctions) is virtually eliminated with the patented SOLA ventilated capacitor compartment. Special core and coil construction, high vacuum impregnation and baking and low operating temperatures all contribute to the long trouble-free life of SOLA Ballasts. So, if you are looking for a fluorescent light ballast that you can specify with peace of mind make it a SOLA. You'll find that when it's a SOLA Ballast . . . "You can install and forget it."

Compare SOLA Sequenstart* with any other ballast.

Here are the significant advantages.

- Positive starting regardless of line condition with patented SOLA Constant Voltage design
- Cooler operation because of ventilated capacitor compartment
- Less wattage loss, lighter in weight and more compact

We welcome any questions you have about ballast design and application. Write for technical bulletin 29-PFL-144.

Compare ballast performance — then specify the outstanding performer.

SOLA
Sequenstart
CONSTANT VOLTAGE BALLASTS

SOLA ELECTRIC CO.
4633 W. 16th St., Chicago 50, Ill.

±10% Regulation... in Sixteen 1¼% Steps

with New URL-16 Voltage Regulator — An Important Addition to the URL-8 Line

ASSURES MORE REVENUE FROM HEAVILY LOADED RURAL AREAS

Here's a new, low-cost answer to economical regulation in rural or suburban areas . . . at the substation or on the line. This new regulator increases the "URL" line for application in locations where a 10% range is not sufficient, and where a ±10% regulator is required. Sixteen 1¼% step operation meets these requirements under any load condition, at minimum cost.

Check these moneysaving features:

10% Regulation, Raise and Lower, in 16 Steps of 1¼% Each—Combines light weight for single-pole mounting with regulation for substation application. A double-purpose feature that cuts costs. Regulator retains every outstanding "URL" feature.

Simple Tap Changer, with Reversing Switch for ±10% Regulation—Cuts maintenance. Assures positive arc interruption and minimum voltage variation during tap changing period.

Package Control Mounted in Improved Control Cabinet—Operating relays are mounted in flexitest chassis. Separate resistance and reactance line drop compensator provides rated line drop compensation with regulator carrying only 67% rated load. All mounted in a cabinet with door hinged to provide workbench when fully opened.

For Further Information, call your Westinghouse representative, or write. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-70602

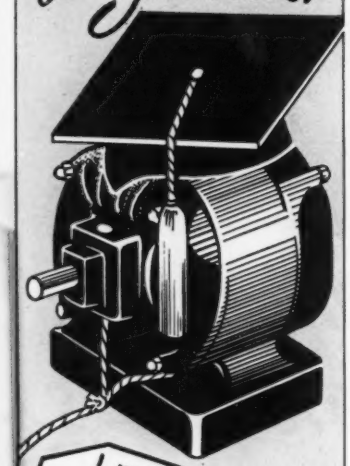
YOU CAN BE SURE... IF IT'S Westinghouse

VOLTAGE REGULATORS

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver.

THE MOTOR OR GENERATOR VOTED

Most likely to Succeed!



IT'S EQUIPPED WITH OHIO BRUSHES

Yes, motors and generators equipped with the proper brush *engineered* to the motor will *succeed* in giving maximum performance. We, with more than a quarter century of know how in the motor and generator brush field, can furnish you with the proper grade and type necessary for maximum output.

ORDER YOUR CARBON BRUSHES FROM A SINGLE SOURCE

West Coast Representative
C. F. BOWERS
544 S. San Pedro St.
Los Angeles 13, Cal.

THE OHIO CARBON COMPANY
12508 BEREA ROAD • CLEVELAND 11, OHIO

BULLETINS ETC.

(32) TRANSFORMER — Construction of the Curvacore distribution transformer is described in a bulletin from Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee, Wis. According to the manufacturer, this unit combines the wound-type core with new insulation applications to give a smaller unit with greater thermal capacity and better voltage regulation than possible with stacked core designs. The bulletin is numbered 61B7641.

(33) INSTRUMENT SELECTION—How to select electrical measuring instruments is told in a 30-page booklet, B-4696, from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. Seven basic factors are explained, types of instruments available in major classifications are listed, solutions are given to four typical selection problems.

(34) FIXTURES—Bulletin 120-51 from Steber Mfg. Co., Broadview, Ill., covers the Steberlite line of cast aluminum fixtures and fittings for PAR-38 and R-40 sealed-beam lamps.

(35) METAL FRAMING—A 78-page construction catalog has been released by Unistrut Products Co., 1013 W. Washington Blvd., Chicago 7, Ill. This catalog 700 is a manual on how to frame, hang, mount and support many kinds of electrical and mechanical equipment with the manufacturer's metal framing.

(36) CABLE WEIGHTS—Rome Cable Corp., Rome, N. Y., has published a 10-page bulletin on copper weights of electric wires and cables, designed for those who must report their requirements and past usage in terms of copper poundage. Pounds of copper per 1,000 ft are listed for most common sizes and types.

(37) CONNECTOR—Data about the Eitherend electrical connector are contained in catalog 49B from Albert & J. M. Anderson Mfg. Co., 289-305 A St., Boston 10, Mass. Each tubular half connector is identically formed, but any two half connectors, within the respective sizes available, can be connected.

(38) FIXTURES—All-plastic-shielded Trimline CP-242 and CP-442 are covered in catalog pages from Sylvania Electric Products Inc., 87 Union St., Salem, Mass.

(39) TABLES—A 72-page booklet, "Tables of Multiple Lengths," has been prepared by U. S. Steel Co. to help steel users get the most out of available steels. These tables can be used to determine exact size of any given number of lengths that can be cut from a longer length. They are compiled on the basis of dead lengths and make no allowance for loss of material in recutting. Copies are available from United States Steel Subsidiaries, Room 4284, 525 William Penn Place Bldg., Pittsburgh 30, Pa.

(40) CABINETS—Redesigned type PH cabinets for relays and instruments are covered in catalog sheet 508 recently released by Pacific Electric Mfg. Corp., 5815 Third St., San Francisco 24, Calif. The cabinets now have improved protection and support for flush-mounted instruments on a hinged panel, as well as for such associated devices as may be included elsewhere in the cabinet. On special order they can be made for surface-mounted instruments.

(41) SCHOOL LIGHTING—Day-Brite Lighting Inc., 5411 Bulwer Ave., St. Louis 7, Mo., has issued two bulletins on school lighting. One is titled "Day-Brite Lights the Way for Students Across the U.S.A."; the other, "It Happened in Denver's Schools—It Can Happen in Yours."

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after November 1

Please send me, without obligation, the new product information or catalogs described on the following pages and identified by numbers circled below:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41

Advertising on page . . . . ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

NAME . . . . . TITLE . . . . .

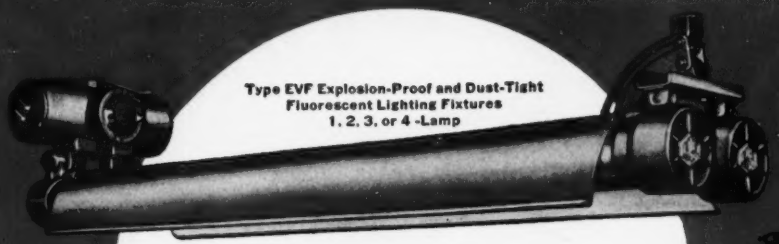
COMPANY* . . . . .

ADDRESS . . . . .

CITY . . . . . STATE . . . . .

* Please include your company's name and your position, since we cannot ask manufacturers to furnish literature unless you do.

CROUSE-HINDS High Efficiency LIGHTING EQUIPMENT...



Type EVF Explosion-Proof and Dust-Tight Fluorescent Lighting Fixtures 1, 2, 3, or 4 -Lamp

EV Series Explosion-Proof and Raintight Lighting Fixtures

. . . for Hazardous Locations

Crouse-Hinds explosion-proof lighting fixtures exceed the requirements for service in highly explosive atmospheres. They are designed to operate at a temperature below the ignition temperature of the gas-air or vapor-air mixture. They are so strong that they will resist internal explosions without damage and so tight that they will prevent the escape of flames or burning gases which might ignite the surrounding atmosphere.

Crouse-Hinds dust-tight lighting fixtures assure safety in locations that are hazardous because of the presence of combustible dust.

DL Series Dust-Tight and Raintight Lighting Fixtures

Type MDB-14 Floodlight

. . . for Wet and Corrosive Locations

Crouse-Hinds vaportight lighting fixtures are ideal for use in boiler rooms, powerhouses, shower rooms, tunnels, loading docks, building entrances, and all indoor and outdoor locations where exposed to moisture and rain, non-explosive vapors and gases, or non-combustible dusts.

Hundreds of industrial lighting fixtures are listed in Crouse-Hinds Condulet Catalog.

V Series Vaportight and Raintight Lighting Fixtures

Type ADE-14 Heavy Duty Floodlight

. . . for Protection

Sabotage thrives in darkness. The most reliable and cheapest form of protection against night prowlers is LIGHT! Crouse-Hinds floodlights project powerful beams of light that bathe all approaches to your property with glaring radiance, killing darkness and shadows and compelling everyone to be more visible at night than in broad daylight.

The protective power of light should be used in all important municipal and industrial locations. The floodlighting of industrial plants serves a double purpose. It helps to boost production in addition to the security it provides.

Send for your copy of Bulletin 2565, "LIGHT! Protect Your Property."

Type DCX Searchlight

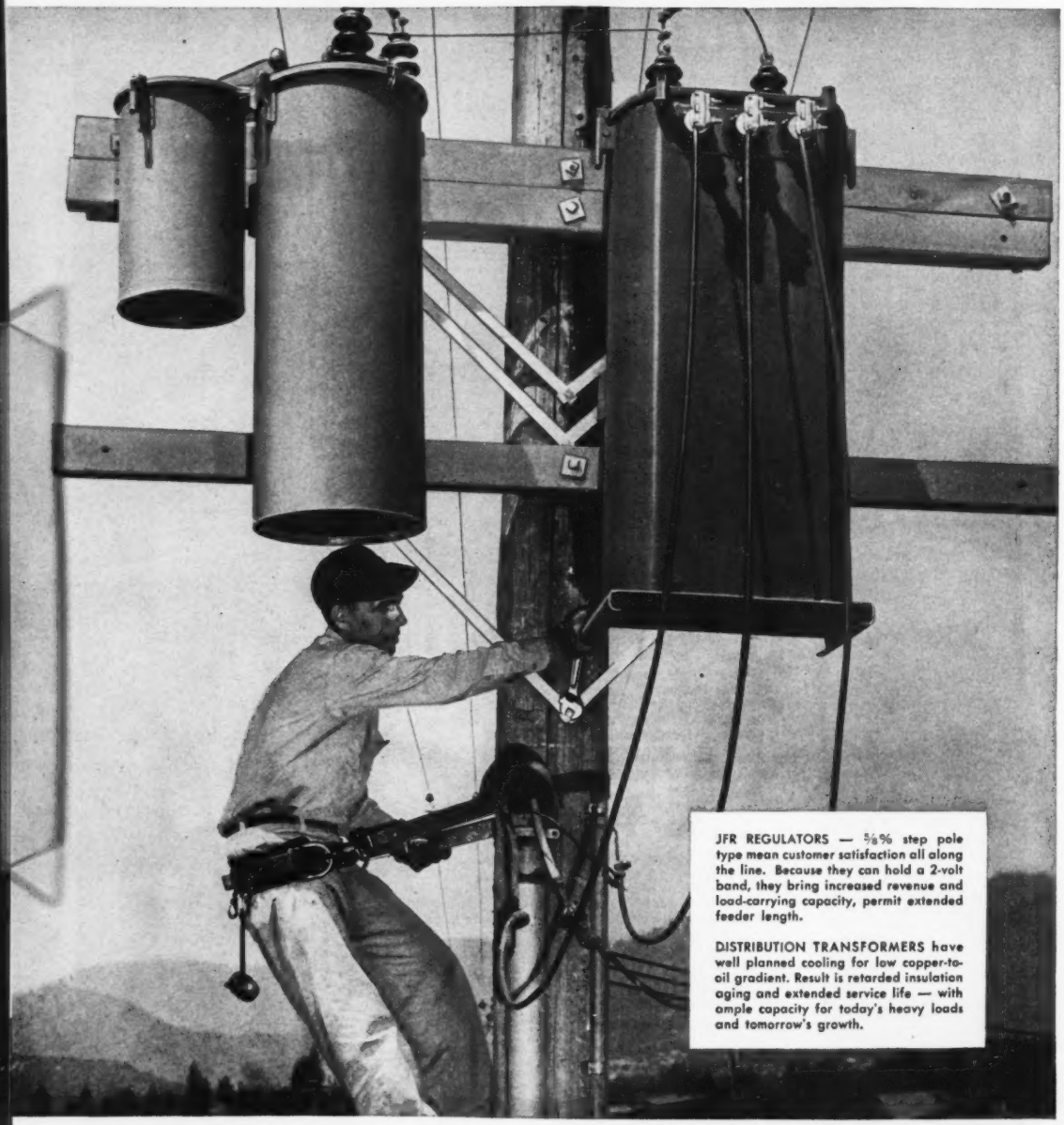
A Nationwide Distribution Through Electrical Wholesalers

CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

Offices: Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas Denver — Detroit — Houston — Indianapolis — Kansas City — Los Angeles — Milwaukee Minneapolis — New York — Philadelphia — Pittsburgh — Portland, Ore. — San Francisco Seattle — St. Louis — Washington. *Resident Representatives:* Albany Atlanta — Baltimore — Charlotte — New Orleans — Richmond, Va. CROUSE-HINDS COMPANY OF CANADA, LTD., TORONTO, ONT

CONDULETS · TRAFFIC SIGNALS · AIRPORT LIGHTING · FLOODLIGHTS

Here's Regulation



JFR REGULATORS — 5/8% step pole type mean customer satisfaction all along the line. Because they can hold a 2-volt band, they bring increased revenue and load-carrying capacity, permit extended feeder length.

DISTRIBUTION TRANSFORMERS have well planned cooling for low copper-to-oil gradient. Result is retarded insulation aging and extended service life — with ample capacity for today's heavy loads and tomorrow's growth.

Equipment for Power: Water Conditioning equipment, chemicals and service... Steam and Hydraulic Turbines... Generators... Condensers... Steam Jet Air Ejectors... Power Plant Pumps and Motors... Transformers... Circuit Breakers... Switchboards and Control... Switchgear... Unit Substations... Utilization equipment.

ALLIS-

Everybody Wants

—BECAUSE EVERYBODY PROFITS!

GOOD VOLTAGE REGULATION pays dividends all around. Customers get all the electricity they need. And they get full value from the power they pay for because their equipment performs better and lasts longer.

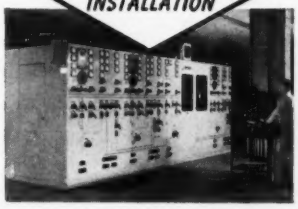
But accelerated growth is pushing peak loads near estimates made a few years ago for 1953, and regulation must be achieved in the face of expanding loads and material shortages.

Now more than ever, your experienced Allis-Chalmers representative can help you utilize the wide line of A-C equipment to solve your power distribution — and production — problems. Allis-Chalmers, Milwaukee 1, Wisconsin. A-3488

Ruptor and *Regulex* are Allis-Chalmers trademarks.

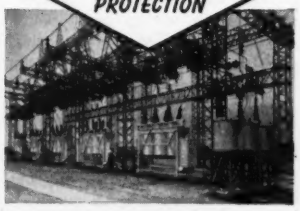
It Pays to Keep Pace with Machinery Progress

EASY INSTALLATION



DUPLEX SWITCHBOARDS are factory assembled for economical installation. Convenient centralized secondary control for primary circuits assures good voltage regulation at the beginning of the line.

POSITIVE PROTECTION



OIL CIRCUIT BREAKERS team up *Ruptor* quick-quench interruptors with mechanically trip-free pneumatic or solenoid operators to minimize system voltage variation by prompt isolation of system faults.

CUSTOM ENGINEERED

SYNCHRONOUS CONDENSERS — used indoors or out — supply reactive kva to regulate voltage and stabilize large transmission systems. Air or hydrogen cooled. *Regulex* control adds fast response to changes.

CHALMERS

A-C ALLIS-CHALMERS

CONSIDER THESE

4 G-E WIRING FACTS

WHEN YOU EXPAND YOUR ELECTRICAL SYSTEM

General Electric Construction Materials Division at Bridgeport is a headquarters for wiring progress

Through constant research and precision manufacturing methods, the G-E Construction Materials Division sets the pace with modern and high-grade wiring materials.

Through distributors in every locality and specialists in the local G-E offices, the G-E Construction Materials Division offers you complete service on any type of wiring problem.

For information on any G-E wiring material product, contact your local G-E Construction Materials distributor, or write Section K-58-925, Construction Materials Division, General Electric Company, Bridgeport 2, Conn.

1. Q. *HOW CAN YOU REDUCE INSTALLATION TIME FOR NEW POWER AND CONTROL CIRCUITS IN LIGHT INDUSTRIAL AND COMMERCIAL BUILDINGS?*

A. Use G-E Electrical Metallic Tubing. This lightweight, thin-wall tubing cuts installation time because it's easy to handle, easy to bend, and easy to install.

2.

Q. *WHAT RACEWAY WITHSTANDS MACHINE VIBRATION AND PROVIDES BOTH FLEXIBILITY AND PROTECTION?*

A. G-E flexible steel conduit is ideal for machine-wiring installations. This tough raceway can be hand-shaped around obstructions where space is limited. It stands up under severe operating conditions where motors and other equipment cause vibration.

3. Q. *WHAT ARE THE ADVANTAGES OF THE G-E REMOTE-CONTROL WIRING SYSTEM IN INDUSTRIAL AND COMMERCIAL BUILDINGS?*

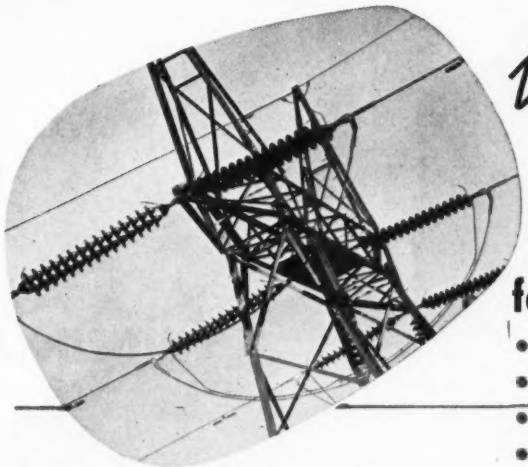
A. G-E remote-control wiring system provides control of corridor lights from central locations to assist watchmen and cleaning crews. The small lightweight control wires can be removed easily as partitions and floor layouts change.

4. Q. *HOW CAN LAYOUT TIME BE SAVED WHEN PRESENT INDUSTRIAL ELECTRIC POWER SYSTEMS ARE EXPANDED?*

A. G-E Varnished-Cambric Interlocked Armor cable—carrying its own flexible raceway—presents no complicated layout problems. This ready-to-install cable can be bent around obstructions, strung over long runs, laid up on existing beams, or installed on racks.

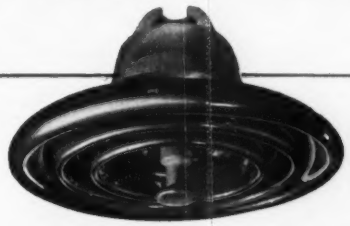
You can put your confidence in—

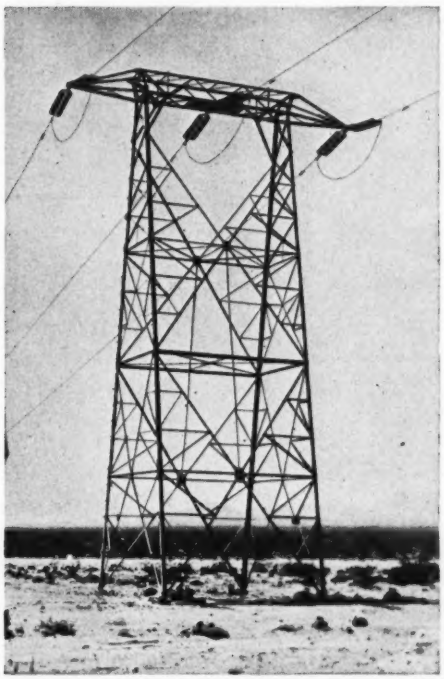
GENERAL ELECTRIC



Demand PROOF OF PERFORMANCE

for Superior Insulator Quality





All insulators are not alike. That is why Thomas welcomes competitive tests. For example . . . in 1938, a large western 230-kv line was under construction. Insulator manufacturers were invited to send samples of their 10-inch suspension insulators for competitive tests.

RESULT: The whole job . . . 50,000 suspension units . . . was awarded to The R. Thomas and Sons Co. That the Customer's choice was right is evidenced by the following telegram received recently:

"Approximately 37,000 Thomas ten-inch suspension insulators were installed on our 230-kv lines in 1938. Balance of 13,000 units used for general construction purposes at different voltages. Have given entirely satisfactory performance."

After all is said . . . it's still quality that counts plus proper designing, precision manufacturing . . . and PROOF OF PERFORMANCE. Since the beginning of the Electrical Industry, Thomas has been supplying porcelain for the most difficult insulation problems. Why gamble?

SPECIFY THOMAS INSULATORS—THE BEST BY LINE TEST SINCE 1873

The R. Thomas and Sons Co.

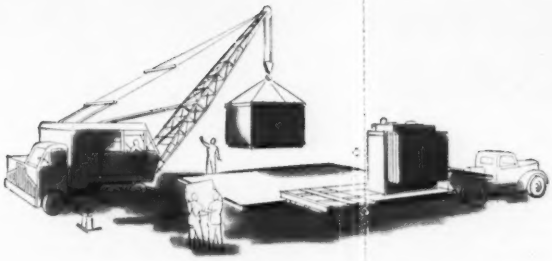
LISBON, OHIO

NEW YORK CHICAGO

1873 THOMAS INSULATORS our 78th year RELIABILITY 1951

Sales Representatives: E. B. Anderson Co., *Detroit* • Paul Berry, *Oklahoma City* • Ken H. Best, *Seattle* • Butler & Land, *Dallas* • R. E. Cunningham & Son, *Los Angeles* • Electric Supply Co., *Albuquerque* • Engineer Sales Corp., *St. Petersburg* • R. F. Hamilton & Associates, *Denver* • R. H. Harper, *St. Louis* • Geo. E. Honn Company, *San Francisco* • W. J. Hugo, *Minneapolis* • Leiser & Company, *Philadelphia* • Lynn Elliott Company, *Houston* • W. C. Milburn, *Chattanooga* • John G. Pettijohn Company, *Knoxville* • H. E. Ransford Co., *Pittsburgh* • Redmond Supply Co., *Phoenix* • J. F. Schaefer & Co., *Kansas City* • R. J. Sullivan & Company, *Boston* • Walter E. Thompson, *Birmingham* • E. E. Torkell, *Memphis* • Triangle Electric Supply Company, *El Paso* • United Electric Supply Co., *Salt Lake City* • Joe Williams, *Little Rock* • *Representatives in other principal cities*

FORT HILL
17
13 KV
GROUND SW
INERTAIRE
CONTROL



Consolidated Edison installs another Westinghouse Unit Substation . . .

for lower, long-range distribution costs!

Con Edison's expansion program aims at *long-range* distribution economy. That's why—wherever possible—they utilize modern unit substations. And what they have to say about a recent Westinghouse installation indicates how conveniently they—*and you*—can attain this objective.

"Its compact, factory-assembled design enabled us to immediately realize savings in real estate costs, in preparation of the installation site and in the actual installation itself. Also, it is contributing to better electrical service by improving voltage conditions. Most important, its flexibility and low-cost maintenance features will enable us to *economically maintain* high standards of service in an area where considerable load growth is anticipated."

Con Edison enjoys these benefits because Westinghouse Unit Substations are specifically designed to meet today's power distribution problems. "Unitized" construction enables you to add "blocks of power" to accommodate increased load requirements. And they're available in types to serve the most modern distribution systems.

For complete information, get your copy of Booklet B-4061. Ask your Westinghouse Representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-60758

YOU CAN BE SURE... IF IT'S Westinghouse

UNIT SUBSTATIONS

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver.

ELECTRA'S HUSBAND

Care and Feeding of Bureaucrats

"SEE that armful of food," Electra said, pointing to a couple of bags on the kitchen table one Saturday morning recently, "well a $10 bill wasn't enough to pay for it and I carried it all into the house without straining. We're either going to economize on our eating or I'll have to have more money in the budget."

"If you bought any meat, I'll guess that at least seven of your $10 went to the butcher," I commented.

"Guess again, mister," she said. "I bought a small leg of lamb, a pound of ground chuck and a pound of bacon and the bill was $8.07. I can see that you need a completely new indoctrination into shopping. Next Saturday you can go with me to carry the bundles and learn a few economic facts."

"Skip it," I said. "I'll take your word for it. Spend whatever is necessary for food. If we have to economize, we'll do it somewhere else. I don't consider spending for food wasteful. At my age eating begins to look like one of the sole remaining pleasures one gets out of life."

"Well, like everyone else, we're going to have to economize someplace," she said with an air of finality.

Later that evening there was reason to think back on this conversation. I was reading through a pile of accumulated material that I had brought home in a briefcase and ran across two items from the Chamber of Commerce of the United States. Both were of a character to make a budget-conscious individual's blood boil.

The first item listed a number of new publications available from the U. S. Printing Office, Washington, D. C. Each had been prepared by some government bureau for the edification of citizens, who, by chance, might find the contents of some value. Two things aroused my interest: most were from agencies in the Department of Interior and the first two lists dealt with some of my avocations—fishing and hunting. Here are some samples:

For the Fisherman: Guide to the Classification of Fishing Gear in the Philippines; Fishery Resources of Micronesia; The Sponge Industry in Turkey; Fish for Breakfast — and Why Not?

Lord knows no fishermen I know have the slightest interest in any of these subjects unless it be Fish for Breakfast. Who cares about the Philippines or Micronesia and, as for Sponges in Turkey, I thought most sponges came from the Gulf of Mexico. And I wondered if the guy who wrote the breakfast book had ever sat down to a nice plate of smelly kippers or a big piece of finnan haddie after a rough evening the night before.

It was the list of hunting books that made me wonder how wasteful and profligate government can get, especially when we are spending money like mad to arm for a potential World War III, and are raising taxes to a point approaching confiscation. How many hunters want or need the following government publications?

Mist Netting for Birds in Japan; Control of Skunks; Habits, Food and Economic Status of the Band-Tailed Pigeon; Deer Mortality from Gunshot Wounds; Raccoons of North and Middle America; Estimating Muskrat Population by House Counts.

What kind of Census bureaucrats count muskrat house populations, I mused. Muskrats?

The next list was so ludicrous that I tried it out on Electra.

"How would you like some new government books?" I asked. "They have been prepared especially for the housewife. Here are the titles: How to Control Vagrant Cats; Recipes for Cooking Muskrat Meat; The Fleas of North America."

"You're kidding," she said.

"No I'm not. You can get any of them from the Government Printing Office. Of course there might be a slight charge for one or two. Or since you are still interested in farming, you might like this one: Interaction of Sex, Shape and Weight Genes in Watermelons. Since you were so economy-minded earlier today, I thought you might like to know how the government is spending your money."

"I'm going to write Senator Nixon," she said. "Give me that list of tripe."

"Just in case you haven't enough ammunition, you'd better read this other publicity release from the Department of the Interior," I said, handing her a pamphlet containing the following:

"DR. BUMP TO IMPORT GAME BIRDS FROM MIDDLE EAST

"The introduction of desert-bred game birds from the Middle East to similar localities in this country is approaching realization, the Department of the Interior announced today. This summer, the Fish and Wildlife Service is again sending its foreign game-bird specialist, Dr. Gardiner Bump, to Turkey, Syria, Iraq and also Iran, if conditions permit, to trap certain species of nonmigratory game birds for shipment to the United States.

"In 1950 Dr. Bump spent six months in Middle Eastern deserts and mountains studying and collecting desirable species not destructive to crops or native birds. . . . Dr. Bump plans to spend six to eight months live trapping from 200 to 500 of each species selected. . . . Dr. Bump's assistant will be James Cox, state biologist of New Mexico. He will help in trapping and care of those birds earmarked for importation."

Electra read the story and said:

"I'm going to send the clipping along to the Senator and ask him to remind those folks of a couple of World War II posters—'Don't You Know There's a War on?' and 'Is This Trip Really Necessary?' You remember them. This kind of foolishness makes a taxpayer's stomach turn over."

"Well, while you are writing you might add a couple of more comments," I advised. "For one, ask him how junkets like this jibe with the President's budget message."

EXCITING CURRENT
Reduced 50%
WITH THE NEW Curvacore TRANSFORMER

1. EFFICIENT CORE AND COIL ASSEMBLY

The *Curvacore* distribution transformer has high electrical efficiency and low operating cost. It's designed with a-wound core made up of cold rolled oriented steel with high flux carrying capacity and low hysteresis loss. Improved coil design offers a more balanced arrangement of core steel to copper. Increased cooling area within windings keeps copper-to-oil gradient low.

Now, you get these added benefits:

1. Exciting current reduced 50%
2. Better ratio of losses
3. Regulation improved 15%
4. Thermal capacity improved
5. Size and weight reduced 15%.

The *Curvacore* distribution transformer is a good investment because its performance will save you money on your system. You get top performance for every dollar you spend.

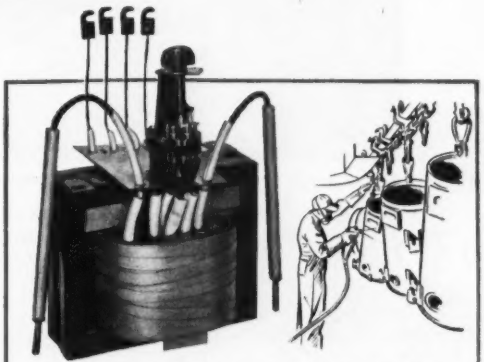
2. EXACTING FINISH EXTENDS TANK LIFE

Formed from heavy gage steel, the *Curvacore* transformer tank is exceptionally strong and completely tight. Tank joints are machine welded to insure permanent protection against leaks and then pressure tested. Tanks are *Spra-Bonderized* and then painted with three coats of alkyd-resinous paint . . . each separately baked on. Previous to shipping, the completely assembled transformer is tested for oil tightness on a machine that tips it toward an inverted position.

Curvacore transformers are now being built in ratings 25 kva and lower. Soon higher ratings will be available.

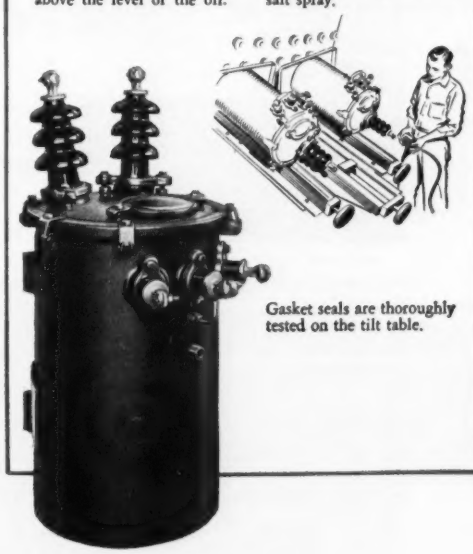
For more information on *Curvacore* distribution transformers, see your local A-C representative. Or write Allis-Chalmers, Milwaukee 1, Wis. A-3413

Curvacore is an Allis-Chalmers trademark.



New internally operated tap changer has handle and position indicating dial plate above the level of the oil.

Special treatment makes surfaces resistant to industrial and humid atmospheres and salt spray.



Gasket seals are thoroughly tested on the tilt table.

Curvacore TRANSFORMERS

ALLIS-CHALMERS A-C

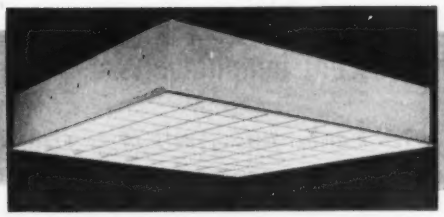
Specially designed four-foot modular louvered square units in one of two legislative committee rooms that seat 300. Anemostats are built into center of some of these units.

Small committee rooms are provided with FRA M-2 units, a deep alzak aluminum parabolic troffer using low-brightness slimline lamps.

A large work area enjoys 60 f.c. using SRAL M-1 recessed slimline units with 45° cutoff and alzak aluminum baffles.

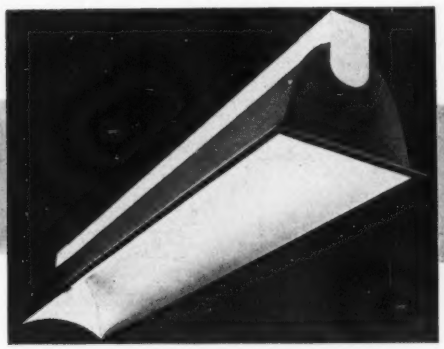
Here is Comfortable Glareless Lighting at its Best!

SRL 44-M-1



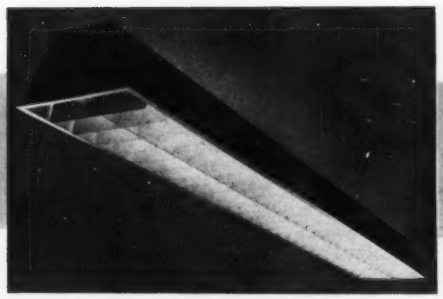
Modular louvered square sections for 6, 8, or 10 lamps. Slimline or fluorescent. Recessed or surface mounted. This series was designed to meet the demands of architects and engineers for large area luminous elements applicable to functional interior lighting. Alzak finished reflectors and hinged louvers provide high efficiency and low brightness.

FRA M-2



Designed to meet requirements for an extremely low-brightness recessed unit. A diffuse alzak deep troffer, flange-type for plaster or acoustical ceilings. Utilizes the 60-inch, 40-watt fluorescent lamp to provide direct, glare-free illumination without the need for louvers. Ideal for low-ceiling or long, narrow rooms.

SRAL M-1



The finest recessed lighting available for offices, schools and commercial establishments. A diffuse alzak, low-brightness, flange-type troffer for plaster or acoustical ceilings. Modular lengths 4, 6, 8 feet. Cross-baffle louvre assemblies are easily removed and replaced for maintenance.

New East Wing Annex of California State Capitol Features Columbia Recessed Fluorescent Fixtures

The new East Wing structure of the California State Capitol at Sacramento has 286,500 sq. ft. of office space lighted in the best modern fashion using Columbia recessed fluorescent fixtures throughout. This deluxe installation was made at surprisingly low cost due to the versatility and special design of Columbia lighting equipment.

The three principal fixtures used are illustrated at the left in detail, and in typical areas of the new building. A number of other special fixtures were also provided by Columbia for lounges and lobby areas.

The new building contains quarters for members of the State Legislature, lounges, committee rooms, the Governor's offices and other departments of state government. Lighting and architectural design were done by the California State Department of Architecture. Electrical installation was done by Victory Engineering Co. of Los Angeles.

On lighting jobs both large and small you will find these good looking, unobtrusive, efficient and versatile Columbia Recessed Fixtures the solution to the problem of providing deluxe high-intensity illumination at moderate cost. A complete line of Columbia commercial, industrial and custom fluorescent lighting fixtures is available through your nearest General Electric Supply Corp. office.

Send today for your free copy of the latest catalog of Columbia lighting equipment.

COLUMBIA ELECTRIC & MANUFACTURING COMPANY

SPOKANE — Manufacturing Division — WASHINGTON

all 4 advantages you want

in a fluorescent lampholder...

exclusive with Benjamin...yours at no extra cost!

In a fluorescent lampholder, the four advantages you want most... the four features that you would include were you designing a lampholder of your own... are *yours* with Benjamin "Springlox." Benjamin brings you this exclusive, patented advancement at no additional lighting equipment cost!

These four most-wanted features bring you everything you require of a fluorescent lampholder: longer life, better electrical contact, speedier relamping and all-around simpler, quicker, safer lighting maintenance.

You get these four most-wanted features exclusively with Benjamin. They are yours as "standard equipment" with every Benjamin Industrial Fluorescent Lighting Unit, whether it uses two T12 lamps or three, bi-pin or single-pin lamps, for individual units or continuous line construction.

*Exclusive with all** BENJAMIN FLUORESCENT UNITS

BENJAMIN

"Springlox" lampholders

sold exclusively through electrical distributors

1 "Built to take it" RUGGEDNESS Practically indestructible ALL-METAL construction. NO BREAKAGE . . . NO out-of-service time due to socket failure. Lamps CUSHIONED against shock and vibration.

2 SAFETY Whether installed in a steel mill or office, lamps cannot drop out or be shaken loose, because "Springlox" is SELF-ADJUSTING for slight differences in lamp length.

3 "Quick-in, quick-out" LAMP SERVICING Makes lamp servicing simpler for all T12 fluorescent lamps. "Finding ring" makes possible "ONE-HAND" lamp insertion of bi-pin lamps.

4 "Never-fail" ELECTRICAL CONTACT Never fails to make contact the *first time*. "Easy-make, easy-break" circuit switch built into single-pin type. Separate springs for electrical contact and locking compression.

Bi-pin type "Springlox" for 2 or 3 lamps

transparent view of "push end" shows how flexible spring base simplifies lamp insertion.

Single-pin type "Springlox" for 2 or 3 lamps

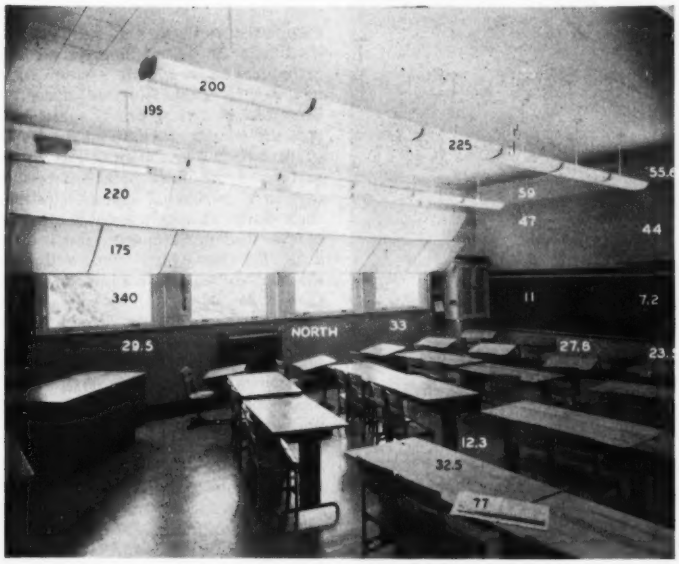
*"Springlox" lampholders are designed to accommodate all T12 Lamps for industrial use.

Send for **FREE "SPRINGLOX" DATA BULLETIN!** Tells you more about time and labor savings made possible by "Springlox"-equipped Benjamin Fluorescent Lighting Units. For your free copy, write: Benjamin Electric Mfg. Co., Dept. J, Des Plaines, Ill.

R-56805

SEPTEMBER, 1951 Vol. 107, No. 3

ELECTRICAL WEST
SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.



Rehabilitated classroom in which fluorescent luminous indirect fixtures were employed

Classroom Salvage Saves Sight Too

Chester W. Jarrett
Lighting Consultant, Portland General Electric Co.

City officials saw street lighting demonstrated and were convinced it could save lives. Now school boards are shown how old classrooms can be remade to save sight

Your old school building does not have to be traded in for a new one in order to provide the last word in highly efficient modern classrooms. The Portland, Ore., Public School Administration has proved that complete rehabilitation of its old classrooms (new acoustic ceilings, new wall color, new chalkboards and tackboards, new floors and furniture, and new daylight controls) all resulting in brightness ratios of 3 to 1, can be had for only 10% of the cost of the same classroom in a new school structure.

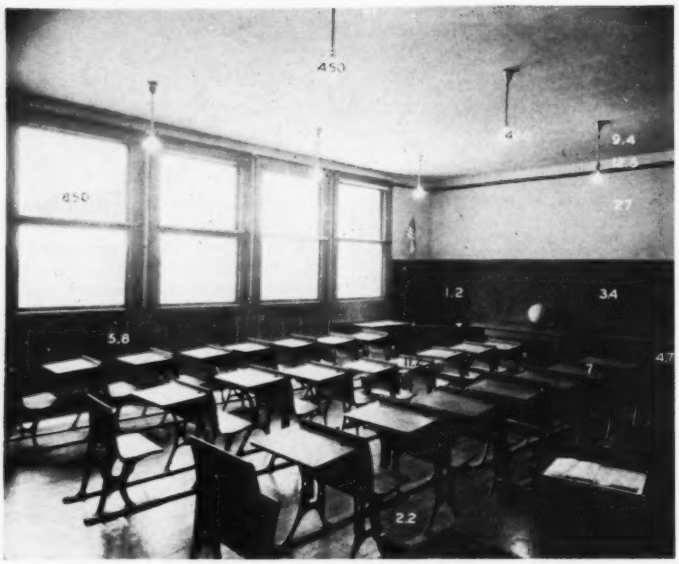
Inception of salvage ideas: Dr. Paul Rehmus, superintendent of the Portland Public School system, and his associates, J. E. Edwards and L. J. Baker, met with the officials and lighting consultants of the two Portland electric utilities (Portland General Electric Co. and Pacific Power & Light Co.) to organize a group to design and construct sample rehabilitated classrooms. Dr. Rehmus volunteered to assign the rooms in the old school buildings and pay the rehabilitation costs if the utility consultants would study the classroom shells and prepare specifications.

Seminar on visual environment: In order to prepare true specifications it was essential that the consultants sharpen the tools of their trade. First, what kind of visual environment should school children have to best meet their physiological and psychological requirements? This problem was presented to Dr. Richard Feinberg, dean of the School of Optometry, and his associates at Pacific University. The Pacific University staff in turn invited Dr. Darell B. Harmon of Austin, Tex., to join with them in organizing and presenting a seminar on visual environment problems in the classroom. This authoritative group combined their skills in a search of the following areas:

1. Vision and learning.
2. Development hazards of the school.
3. Functional classroom design.
4. Reflectance, color and decoration of ceilings, walls, chalkboards, tackboards and floors.
5. The control of daylight.
6. Artificial lighting.
7. Furniture.
8. Acoustic treatment.
9. Air conditioning.

Findings: The first impressive conclusion of the seminar was that the present-day foot-candle meter measurements can no longer be used to analyze the visual environment in the classroom. The "peddler" who has preached minimum costs by advocating bare-tube fixtures with little or no redecoration of walls has thrived under the high direct readings of his old stand-by, the foot-candle meter. Of course, there are many uses yet for this meter, but the analysis of any environment where close continuous visual tasks are performed, particularly in offices and school classrooms, requires control of all brightness areas in both peripheral and central vision seeing. The seminar soon established the fact that the first step in rehabilitation is not relighting but redecorating the shell of a classroom plus the addition of refinishing or new furniture, with light nonspecular surfaces.

All of the exposed areas in a room become distributors of light. As the largest area in the visual field, however, the principal wall surfaces must



Untouched classroom—high contrasts of brown desks, oil soaked floors, black chalkboards, bare light bulbs, windows without daylight control—used to show typical existing rooms

Directly below it, completely rehabilitated—new decoration, acoustical ceiling, green chalkboards, tackboards, tile floor, new mat-finished furniture and daylight control

approach task brightness on the desks.

Reflectances: The Pacific University seminar produced evidence of the need for wall reflectances approximating 60%. The ceiling area and adjacent wall surfaces down to the level of the luminous indirect fixture function solely as distributors of light and should be of the highest possible reflectance consistent with maintainable finish materials: 85% or slightly plus. The furniture should be finished in nonspecular surface with a reflectance of 30% plus, chalkboards 20% plus, and floors 20-30% plus, in order to maintain brightness ratios consistent to good visual performance at close task.

Daylight control: The control of daylight window brightness was such an important factor that the distributors of both glass blocks and spun glass diffusors were each invited to present their views on daylight control. The theory that glass blocks are used merely for ornamentation was eliminated right at the start of the discussion. It was explained that the glass blocks have an outer pane which has on its inner surface specially formulated vertical prisms which direct the outside daylight to the inner space between the panes. The inner surface of the inner pane has prisms cast in a horizontal direction which then direct this light over the heads of the students and into the ceiling area. The flat white ceiling redirects the well-diffused light into the task area.

Spun glass diffusers on the other hand are suspended out from the inner surface of the window at an angle of 45° and reflect 65% of the window brightness in the ceiling area and transmit 35% into the room in order to keep the contrast down.

Floors: The discussion of floor treatment brought to light a wealth of materials, but for the most part, floor rehabilitation fell into two categories:

1. Structurally sound floors that could be sanded and refinished or recovered.

2. Structurally poor floors that could be covered with a plywood base, using linoleum or asphalt tile having a reflectance of 25%.

Chalkboards: Blackboards were immediately ruled out because of their high contrast with the other surfaces of the room. Standard green chalkboards were accepted as a vital part of classroom environment.

Acoustic treatment: Noise situations were evaluated in a thorough study of reverberations from walls, floors and ceilings in both classrooms and adjacent hallways. The consensus was that, since the Portland Public School system had been using fireproof acoustic treatment in both the classroom and in the hall, it would be specified as total treatment.

Artificial lighting: The wide gap between incandescent and fluorescent lighting was quickly closed by the fact that the new de luxe line of fluorescent tubes places them in the same category, spectrally speaking, as the 3,000° Kelvin incandescent lamps.

Fixture men for the most part are very confident of the superior performance of their respective equipment, but the seminar boiled their specification down to terms of *surface*

brightness with higher visual performance resulting from the selection of luminous indirect equipment.

It was decided also that the classrooms should include both incandescent and fluorescent installations.

The management of the Portland Public School system authorized the use of the Richmond and Alameda elementary schools for the rehabilitation studies. Richmond has a southern exposure situation with an upper level classroom for the "as found" example, and the identical room directly below it on the first level was set up as the model incandescent installation. The classroom with the northern exposure was used as the model fluorescent example.

The Alameda school provided a classroom with a western exposure for use with fluorescent equipment, and the incandescent fixtures were installed in a room with an eastern exposure, thus providing, in all, the four points of the compass.

To isolate color and light source preferences, the incandescent lighting was installed in a Richmond school room decorated in pastel green, and the fluorescent light source was used in a room with the warmer peach tones. The decoration-fixture arrangement was reversed at Alameda with the incandescent light being used in the warm-tone room and the fluorescent fixtures being hung in the room decorated in green.

Classroom demonstrations: During the summer months, the four school rooms were completely rehabilitated; new acoustic ceilings, wall colors, new floors with Class D asphalt tile, new green chalkboards, cork tackboards, spun glass diffuser screens, new experimental furniture, and new shades and lighting.

At the opening of the fall school season, the state, county and city school officials were invited in groups of about 20 to hear and see the demonstration on classroom environment. The guests were first seated in the old upstairs classroom at Richmond and given a talk on brightness ratios, using 2x2 slides, to illustrate the psychological and physiological stresses on students exposed to such high brightness ratios. This was followed by a demonstration of both the incandescent and fluorescent classrooms with their new environments, and a discussion was held regarding rehabilitation specification and construction costs.

Sixteen major groups have been processed through the medium of these classrooms, including, to date, school boards, city councils, architects association, college illumination classes, etc. One meeting accomplished a great deal by bringing together the managers and representatives of firms manufacturing lighting fixtures and the management of the Portland Public School system.

Summarizing: The benefits of this activity are:

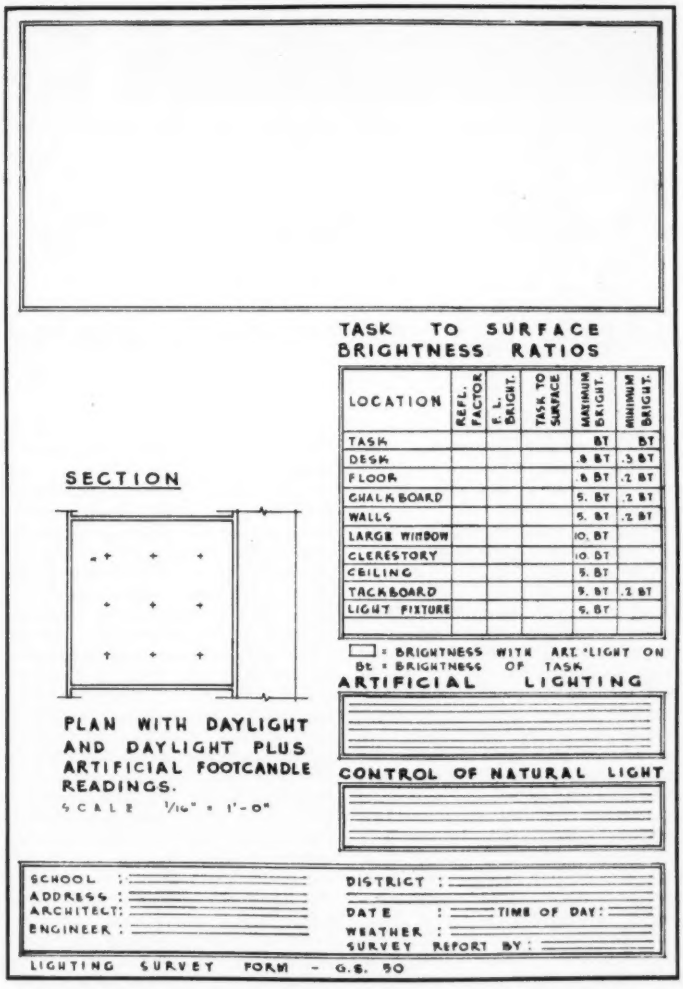
1. The objective is high (raising the standards of preventive eye care of the new generation).

2. The school administration receives a unified consulting service of true specification from the architect, the ophthalmologist, the optometrist and the illumination engineer, with no strings attached.

3. School boards and people in general are informed of the tragic situation in some of our classroom environments.

4. The taxpayer's dollar is more readily directed into this building channel for the benefit of all concerned.

5. The utility receives friendly commendation from both the school officials and parents in sponsoring a program of providing better facilities for our school children.



Lighting and brightness survey form used to check southern California schools, developed by Charles D. Gibson and Foster Sampson. A perspective sketch of the classroom was drawn in large rectangle space, a section across the room where indicated, brightness readings on the plan, ratios entered in table at right, description of artificial and natural lighting in the boxes indicated, other data below. Instructions were supplied also

Aurora Blvd., with 20,000-lumen mercury units, 30 ft high, 120 ft staggered, 1.2 f-c. Right, type of mounting on existing poles

Seattle's Safety Lighting—

$4,000,000 program is now one-third complete

In the hope of reducing night accident rates by 35%, or not more than the daytime rate, Seattle voters passed by four to one a $4 million general obligation bond issue to relight its streets. The total plan calls for relighting 334 miles of its 1,350 miles of improved streets. These streets carry 75% of all night traffic and some of them have had a record of being where a large portion of the crime was committed. For Seattle's 462,981 population the per capita cost will be $8.50.

As of Aug. 1, 1951, the program, authorized in November 1948, was about one-third completed, with 97.3 miles relighted with mercury vapor lamps at an expenditure, so far, of $1,440,000, and with the most costly portion of the program behind.

Mercury lamps were selected as standard because of the high-intensity light source, which permitted a higher mounting height and fewer units per block to get the same illumination from a lower power consumption. Another factor was that, with this source, a greater number of streets could be lighted with the power available. (The Northwest has been experiencing a prolonged power shortage.)

Horizontal burning luminaires were adopted as standard because of the high coefficient of utilization and modern design. The units purchased are of several makes. Recommended standards of the Illuminating Engineering Society were used in the design of the program. Heavily traveled streets with large numbers of pedestrians were prescribed to have an average of 1.2 foot-candles. Streets with light traffic and few pedestrians receive an average of .75 f-c.

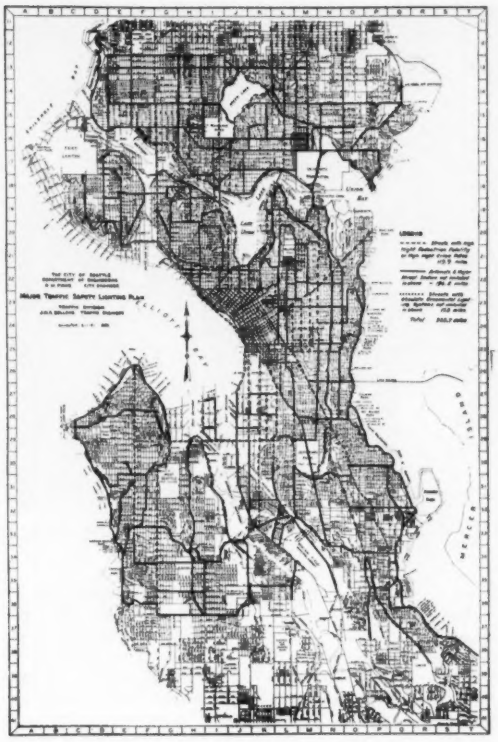
Although there are slight variations in mounting height and in spacing to meet existing roadway conditions, as a rule staggered spacing at 100- to 120-ft intervals is used with 30-ft mounting heights. Mounting from one side of the street has proved satisfactory in some cases for roadway widths up to 42 ft.

Because about 85% of the lighting will be from existing or new wood utility poles, the spacing must be fitted to such conditions, but pole spacing is very close to the ideal. Using existing poles has enabled cuts in unit costs to less than a third of new steel poles with underground wiring.

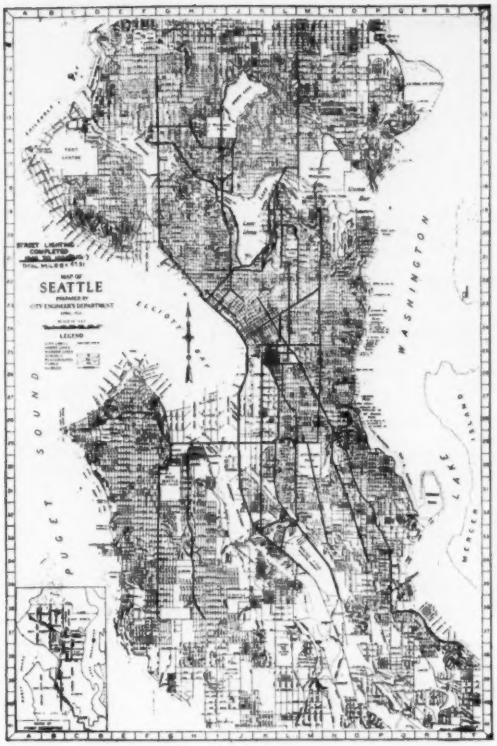
Steel poles are used in special cases where the street has no utility poles, such as on boulevards and adjacent to parks. Steel poles used are octagonal and tapered from a square transformer base. The wiring for these is neoprene jacketed cable buried directly in the ground, 18 in. deep, just back of the roadway curb for maximum protection. It comprises about 15% of the total installation and is done by contract. Steel poles, brackets and hardware are standardized and many items are made locally.

Wood pole installations are being made generally by a special crew of the city's engineering department. As will be seen from the accompanying picture, the bracket for wood pole jobs is designed to clear a crossarm as it extends out over the roadway. This is to provide safety both for the installers of the street lighting and of utility linemen climbing the pole for other utility services.

The special crew consists of a superintendent of street lighting construction, an assistant engineer, a foreman, six linemen, three groundmen, two line material men who also drive the tower trucks, plus construction office and warehouse personnel. Two trucks with a 28-ft hydraulic lift and a pickup truck are used. New poles are set by contract or by the



Map showing total $4,000,000 relighting program, dotted lines used to show streets having highest recorded fatality experience



Dark lines show streets already relighted as of Aug. 1, 1951, a third of total program, the most vitally needed streets being first

use of other city-owned equipment.

This organization installs about 15 units a day or about 1½ miles per week on wood poles. Installation costs vary but the average on existing wood utility poles is $170; on new wood poles $220. Sometimes the latter involve crossarming for existing utilities. New steel poles with concrete bases and underground wiring run about $560 to $600 per unit, including engineering and incidental charges.

Included in the program too are special problems such as tunnel and subway lighting and the relighting of the downtown streets. Because the downtown streets have ornamental street standards and fairly high levels of illumination, they have been left to the last in favor of getting illumination to streets having poor or no illumination. They will receive attention in the future.

Tunnel Lighting Technique

Despite a trend toward fluorescent lighting of tunnels and underpasses, Seattle has carried its standardization on mercury lighting into the lighting of two vehicular tunnels with good results. The cost too is estimated to be about two-thirds of what it would take to get the same roadway intensities with fluorescent lighting, especially since high intensities are required at tunnel entrances in the daytime to adjust drivers' eyes to the difference between outdoor and inside levels.

The tunnels carry traffic in one direction. Dome of each is 23 ft above the roadway. It is possible to get a high mounting height and shield light from the driver's eyes. In the first tunnels, Westinghouse OV-20 top-mounting luminaires are spaced 20 ft above the roadway on 40-ft centers, staggered, and give an average intensity of 4.3 f-c at pavement level. This compares with 0.35 f-c provided by the former sodium vapor lamps mounted on 60-ft centers.

Tunnel entrances are given higher intensities, beginning with 50 f-c and tapering gradually to the 4.3 in the tunnel, about 250 ft inside. Photoelectric control turns these additional units on in the morning when daylight reaches 500 f-c and turns them off at night when daylight falls below 400 f-c. Holert Electric Co. made the installation at a cost of $21,770.

Walls were painted at the tunnel entrances for additional reflected light but not throughout the tunnel because of high maintenance cost.

As the work had to be done while the tunnels were in use, the city engineering department designed a rolling scaffold to span the roadway and fit the bore of the tunnel. Safeway Steel Scaffold Co. built it and after being used by the contractors, it is demounted and can be reassembled to use in maintenance. It provided working platforms giving access to the lights or for painters along the sides.

A picture of the lighting in the Lake Way tunnels is to be found on page 87, in the pictorial section devoted to outdoor lighting applications. It shows the close spacing of units near an entrance.

Seattle's street lighting program is being handled by the city engineering department under City Engineer R. W. Finke, and under the principal engineer in charge of design, Ward Tyler, and his associates.

VERSATILE LIGHT

Available in many light sources and adaptable to many forms, it heightens sales appeal, extends the day for work or play, improves industry and business efficiency as for instance:

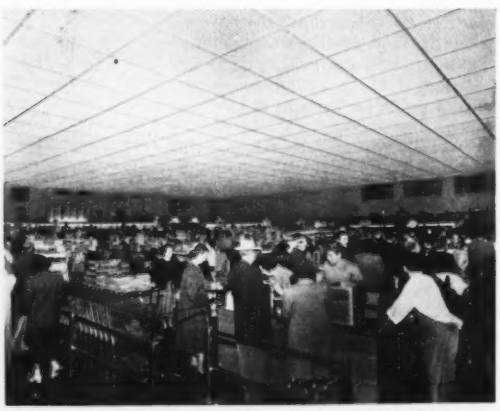
In Stores

← Pacific Beach

Coeur d'Alene ↑

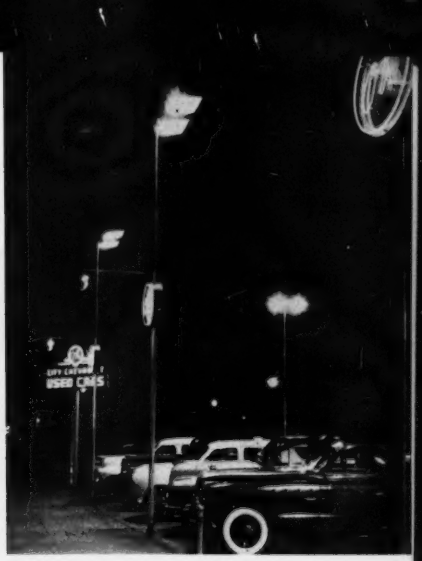
Several techniques for lighting a store are illustrated here. In Muehling's department store, Pacific Beach, San Diego, the recommended 1-3-5-10 scale of lighting for selling is employed, thanks to Larry Tokar, designer, and Reynolds Electric, which made the installation. Slimlines are used for general illumination, in flush-mounted ceiling troffers. For accent on counters and islands, down-lighting spots, both in the ceiling and in decorative fixtures. Coves with fluorescence illuminate both the upper walls and show case interiors with high intensity. . . . In Coeur d'Alene, on the other hand, Rex Drug Co. had Power City Electric Co. of Spokane remove old bare lamp fluorescent pendant fixtures and drop the ceiling and install 300-w incandescent lamps in R-5540 Holophane units. . . . Consumers Market in Tucson represents one treatment of supermarkets, with parallel rows of Sylvania louvered fluorescent fixtures, 15 ft apart, lamped with Warmtone lamps. . . . Max Garth's Best Food Market, Los Angeles, concealed all the roof, piping and fixture equipment and concentrated attention on its merchandise by CEPCO louvers over entire area. John Grady made the installation

Tucson



Los Angeles

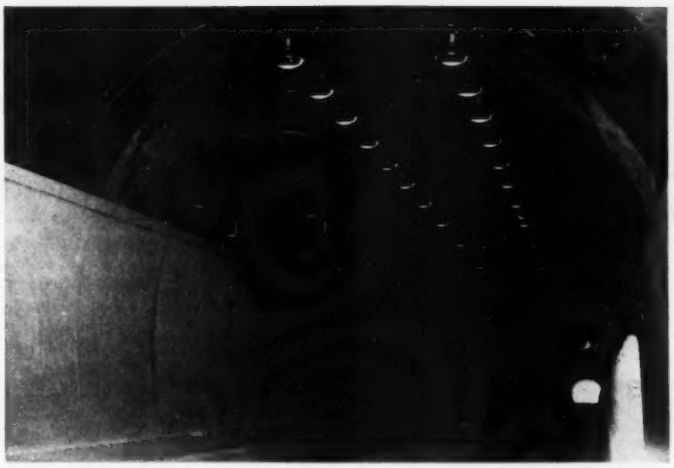
Mercury floodlighted service station in Berkeley



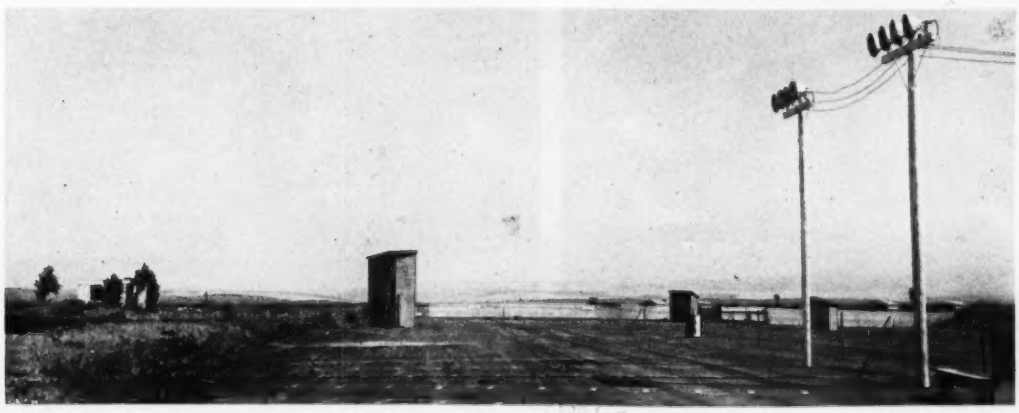
PAR spots on bracket arms, San Diego

All Outdoors

More light per watt was obtained when Standard Stations Inc. replaced incandescent 750-w lamps with 400-w, 21,000-lumen Westinghouse mercury vapor lamps in five existing reflectors, at San Pablo and Ashby, Berkeley, to gain 36% in illumination and four times longer life.... To give its used cars a "window lighting" on their fronts, City Chevrolet Co., San Diego, had Zweiner Electric mount brackets with five 150-w PAR 38 lamps 14 ft above the sidewalk on brackets in addition to 1,500-w lamps in Benjamin scoop units above, on advice of C. J. Bunce, San Diego Gas & Electric. To get maximum value from lot lighting, the sidewalls of the building around it were painted in light color.... Seattle tunnel and street lighting is described in detail on pages 84, 85.... Skeet field picture shows a lighting opportunity



Lake Way Tunnel, Seattle, with closely spaced mercury units near entrances, shielded



Skeet field on old airport runway, Walla Walla, floodlighted for evening shooting by eight units on two poles, a simple, effective job

SERVES THE NEEDS OF INDUSTRY

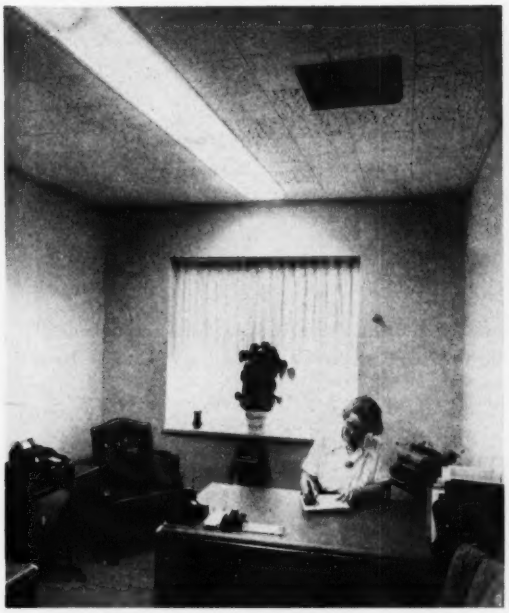
LARGE AREAS, as in the plate and welding shop, Western Machinery Co., Sacramento, lighted with 750-w mercury lamps, 19x25-ft centers, 24-ft mounting, produces an average 23-f-c level. Before relighting the level was about 5 f-c. Sharp cutoff of reflectors reduces glare. W. J. Flynn, Sacramento MUD, advised

EXPLOSION-PROOF lighting equipment is required where the atmosphere is dusty as in grain conveyor passageways in Great Western Malting Co. plant at Vancouver, Wash. Emory & Bohm Electric, Portland, designed and installed systems of general and of signal lighting, controlling switchgear as well as interlocks

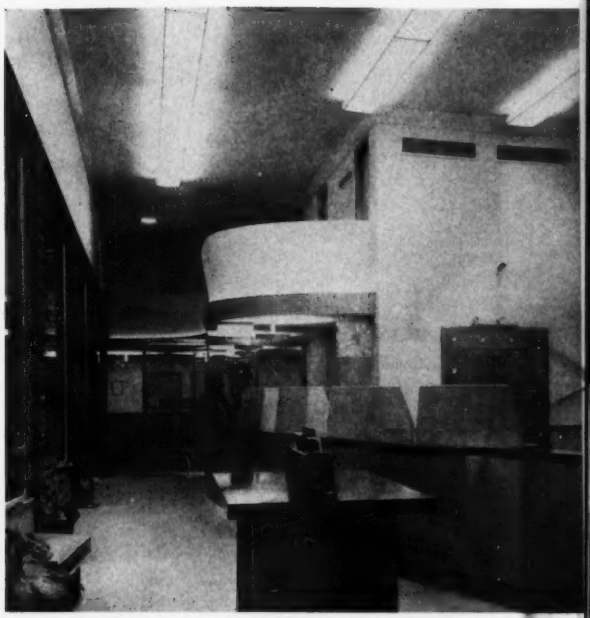
PRECISION MANUFACTURE requires abundant general illumination, as represented in the printing plant of Deseret News, Salt Lake City, where Wasatch Electric revamped former Remington Arms plant wiring and lighting, installing busduct for power and trolleyduct for lighting. Two- and four-lamp slimline industrial fixtures in continuous rows provide 75 f-c on the work

PARTS BINS, closely spaced in narrow aisles, with deep bins, present a problem in lighting every industrial faces. In a condition typical of tool and parts storage in industry, George B. Wallace Motors, Portland, had Ray W. Preston, engineer, and Graham Electric, contractor, advise and install All-Brite Versalite louvered fluorescent units between rows, giving vertical illumination

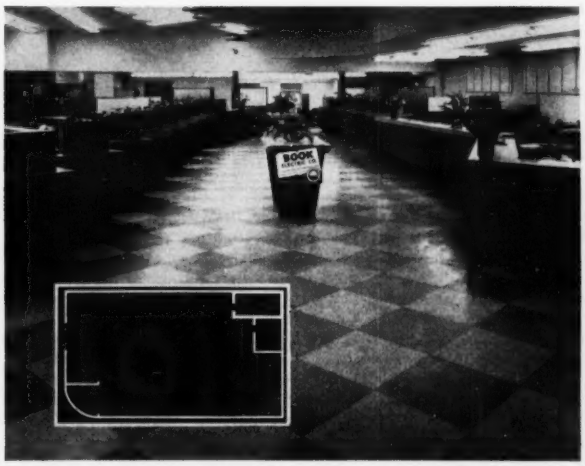
AND OF BUSINESS



OFFICES of all kinds need sound, air and light conditioning for maximum personal efficiency. Ideal conditions are found in this secretary's office in Idaho Compensation Co., Coeur d'Alene, where Holophane Controlens on Columbia slimline troffers provide low brightness in highly reflective surroundings of paint



PUBLIC service areas, such as the counters at La Mesa-El Cajon Savings & Loan Assn., where high ceilings abound, can be lighted as this was by California Electric Works, from C. J. Bunce, SDG&E designs, with Holophane lenses and Sunbeam shielded louvered slimline units, with Guth Seelux rings under balcony



CONFORMING to odd architectural treatment requires ingenuity, as inset diagram of fixture arrangement shows for Southern Commercial & Savings Bank, East Pasadena, with its staggered tellers' windows. Ruby of California designed lighting with its Ovion 4-lamp slimline fixtures over each teller's cage. Book Electric Co., Altadena, installed ballasts remotely in separate room

RECORDS of all kinds, books, libraries, files, kept in vertical shelves or bins to save space present a seeing problem. For such situations, as in the Harrison Memorial Library, Carmel, All-Brite Versalite fluorescent fixture was designed for vertical as well as horizontal distribution. In this case an average of 32 f-c is obtained on stack book titles. Ets-Hoken & Galvan made installation

Master bedroom has lighted valance, bedside and dresser lamps

Living room has two valance fixtures and two CLM table lamps

The Sample Sells Home Lighting

While industrial lighting has advanced in tremendous steps, and commercial lighting has been used lavishly as a prime sales maker, and even the schools are at last relighting to scientific and eye comfort standards, home lighting has actually declined. It has fallen prey to a new fad for dark interior colors and bullet-shaped lighting fixtures, which the interior decorators have put over on a style-slavish womanhood. It has declined also because the educational activity that went along with the home calls of home lighting advisers and lamp salesmen has ceased to be in all but one or two utility systems.

Another approach to the re-education program so sorely needed for home lighting was made on a sample basis last year in San Jose. The sample proved so acceptable to the public that this year another is being used and a half dozen more are in prospect.

This year's first such model home, scientifically lighted and adequately wired, is called the New Day model home. It is in El Campo Terrace, on Alum Rock Ave. and El Campo Drive, at the beginning of the San Jose, Calif., foothills. Last year's was known as Sunrise Home, and it was located in the Los Gatos area. It involved residences in a more expensive price bracket. The idea in the New Day home is that a greater mass market can be reached through the promotion of scientifically lighted homes bearing a lesser price tag.

With it as the first model, Northern California Electrical Bureau has lined up builders who will build and put on similar display low-priced homes in Santa Rosa, Fresno, Stockton and Sunnyvale. Perhaps more will do so subsequently if the house building limitations are not made more drastic by NPA.

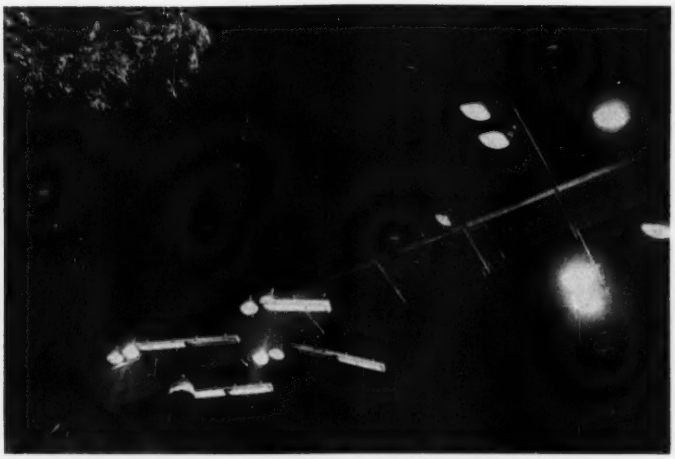
The New Day house is in the $11,000 price bracket. It was opened for public inspection June 24. The builders planned to keep it open for inspection seven days a week from 10 a.m. to 9 p.m. for 90 days. Approximately 1,100 people visited the house on opening day and since then an average of 750 people have visited the house on Sundays and 75 each week day. The house has been sold. The furniture people have obtained business from it. The electrical contractor has sold many lighting jobs and everyone is happy. All 107 houses in the tract will be adequately wired and lighting will be installed for all buyers who order it.

The builders, Joaquin & Garnet of Los Gatos, built it to designs by Clover Craft Studios in San Jose. Realtors for the tract are Briscoe, Emory and Brimberry. Ventry Electric Co. of San Jose was the electrical contractor and Graybar supplied the Moe fixtures and valances. Certified floor and table lamps were by National Lighting Equipment Co. L. H. Bennett, manager, Northern California Electrical Bureau, and W. M. Wheeler, Pacific Gas and Electric Co., were responsible for the promotion of the project. William Addison, PG and E, and Kenneth Cumming, Moe Lighting Co., and representatives of General Electric Lamp Department, made the lighting layouts.

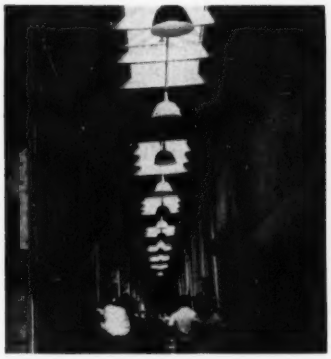
Lighting was laid out according to the recipes in "See Your Home in a New Light," the General Electric booklet, which with "Electricity in Your Home Plans" and "Your Certified Lamp," was distributed to visitors to the home. It thus represented an effort to tie in with the nationwide better home lighting program.

Valance lighting above each window in the living room and master bedroom is the feature that attracts the most attention. The valances contain fluorescent lamps behind a metal shield which has a translucent panel in it that diffuses the light. Now available in packaged units and in various sizes, they can be made to fit any width of window opening. Besides the lighting, the house contained a built-in Thermador bathroom heater, kitchen fan, chimes, and was wired for range. Martino's Furniture & Appliances of San Jose supplied furnishings and Hotpoint range and refrigerator for the initial showing.

Above, fluorescent waterfall; below, shielded RLM units hide light sources



Above, how floods and UV black-light-tube units were mounted on catwalk above waterfall; below, light deflectors for PAR lamps along a wall over small individual displays

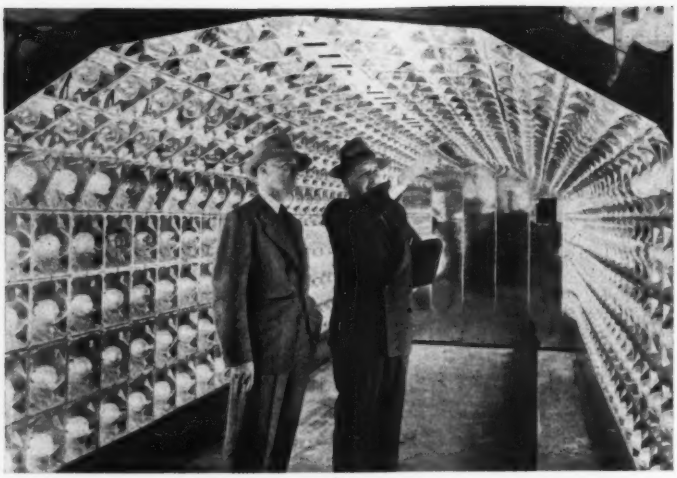


LIGHTING A FLOWER SHOW

Fluorescent water in a waterfall and pool makes spectacular central feature in Oakland Spring Garden Show; lighting designed to be inconspicuous but plentiful

Not often is the illumination of a garden show engineered, but at the California Spring Garden Show in Oakland in April, Beamer & Tilson engineered both the 75-hp waterfall pumping installation that supplied the main auditorium central feature, but the lighting to make the water fluoresce and all lighting of the two huge buildings and outside overflow gardens as well, some 1,000 amp of power in all. It required installation by Scott-Buttner Electric Co. of some 32,500 ft of extra wiring above that in the auditorium, special temporary switchboards, outside 70-ft poles for yard lighting and equipping of all reflectors with extra shields to cut off glare from light sources at normal viewing angles.

Water in pool and waterfall was treated with fluorescent chemicals, 1 part per 1½ million, prescribed by Marcel Vogel, Vogel Luminescence Co., and tested with a pH meter. Fans were hidden under flower beds at each edge of the pool to blow the spray back to the pool instead of over the show. Cliff Sommarstrom calculated it would take a 900- and a 1,200-cu-ft-min blower with several nozzles to control the spray. Color of the water at first worried the show director but placing black light units all in front, none at sides, eliminated stripes and gave satisfactory results. Black light was on continuously; white was on seven minutes, off one minute, controlled by a clock, relays and contactors to break 94-amp lamp load.



Forty Cents Worth of Infrared Does the Job

Electrical energy cost of an infrared baked enamel paint job on an automobile is the surprisingly low figure of only 40c. That is the experience of the J. W. Allen Co., automobile dealer and service agency of San Francisco, which has installed the first infrared oven for car painting in northern California. There are only two other infrared ovens of this type on the Pacific Coast. These are in Los Angeles.

The accompanying staff photographs show the Fostoria Durabake tunnel-type oven installed. It contains 50 kw in G-30 clear infrared lamps in Fostoria gold-plated reflectors. Lamps of 125, 250 and 375 w are connected in various series-parallel combinations to provide a balanced 3-phase load and even heat over the car. The inside of the doors at both ends of the oven are gold plated also to reflect the infrared rays on front and rear of the car to insure even baking. Time required for baking is 15 to 20 minutes. This enables the oven to handle 24 cars in an 8-hour day.

A factory-equal enameled job is baked on at a temperature of 200°. In the 20-minute baking period the tires and glass do not exceed 160°, which is a safe temperature limit, and they are in no way damaged.

An essential part of the installation is the spray booth shown. This particular booth is a Sprayking automatic spray booth made by the Commercial Air Conditioning Co. of Los Angeles. It is, of course, explosion proof. An air interlock is provided so spraying is impossible unless the doors leading into the infrared oven are closed. Also, the booth must be exhausted, or purged, for five minutes before the lamps in the oven can be turned on. There is a further interlock that prevents spraying unless the air exhaust system is in operation.

Another piece of infrared drying equipment, applicable to any body and fender repair shop, is to be found in the J. W. Allen plant. It is the portable infrared lamp bank shown. This is a 16-lamp unit consisting of all 250-w G-30 clear lamps in Fostoria Evenray gold-plated reflectors. There are three of these caster-mounted units, each of 2.8-kw capacity. They have adjustable top sections and are used for baking paint on fenders, doors and body panels. Unlike the small 4-lamp infrared units so widely used for spotting, these larger units cover enough area to do a baked enamel job in 30 minutes, equivalent to that of the large oven.

Spray booth and infrared oven in the Allen shop represent an investment of more than $10,000. The company expects to do a volume of business that will keep the oven busy and enable the organization to maintain its introductory price of $69.50 for a factory-type baked enamel paint job in eight hours.

Pacific Gas and Electric Co. is the serving utility; Bay Electric Co. did the wiring job.

Explosion-proof spray booth, left, and portable infrared baking bank, right, are essential parts of the installation at J. W. Allen Co.

ELECTRICAL WEST Contractors' News Letter

New construction now shows the effects of squeezes both of credit and materials. With all construction going under CMP in August, still further control will be felt. While amusements, etc., were removed from the forbidden list, and permissions to build are to be extended over more classes of building, perhaps more copper has been allotted than exists, especially with a copper strike going on.

Choked

Private home building is about 30% under last year's rate. Under CMP it may pick up some, for by being careful in circuiting, perhaps using low-voltage control by lighting, even an Adequate Wiring certified job can be done within the 35-lb copper limitation for a small house. Only wire is on the A list, not panels, fittings or fixtures. A conduit job is out, but in knob & tube or nonmetalic sheathed cable, the steel limitation won't hurt. Careful reading of the construction order is recommended, and advice from local NPA representative over any details. Oct. 1 is an important date in respect to getting approvals.

Tight pounds

Nothing had been done, up to Aug. 31, about price increase allowance by OPS for construction to permit increase in wage rates. Even the Capehart amendment, which OPS does not like, has not been any help so far.

Snarled

Westinghouse created a stir in the fluorescent lamp field by increasing discounts to quantity lamp buyers. Every F lamp, including slimlines and circulars, was included. Other lamp companies, caught off base, were expected to revise their schedules too, at least by Oct. 1.

Lamp drop

Ed Buttner of Scott-Buttner, Oakland, was appointed by California's governor, Earl Warren, to succeed Roy Butcher, San Jose, on the state Contractors' License Board, a post Butcher has held since the law was put into effect in 1929 and for whose board he has been chairman.

Quick change

George A. Harder, who has been assistant field director of NECA with Matt Sherwood, for districts 6 and 8, out of San Francisco, has been made executive manager of the Electrical Contractors Assn. of Santa Clara and San Benito Counties, with office at 580 Stockton, San Jose.

Independent

A telescoping television antenna, called Stratascope, has been developed and is being marketed nationally by Wire Electric Co., electrical contractors, 1115 Center St., Tacoma. A single 10-ft piece forms the base and inner pipes can be telescoped out to 50 ft. It was made for easy installation and is equipped with ample guy wires; complete mast can be turned from the base to adjust for direction and maximum signal.

Fits all

NECA's Golden Anniversary convention starts Oct. 9-12, in Washington, D. C., and will be well attended by delegations from chapters in the West. The administrative committee meets Oct. 5, labor relations committee Oct. 6, board of governors Oct. 8 and again Oct. 12 to wrap up actions taken during the convention. Don Clayton of Atlanta, long-time member of the administrative committee, has been nominated for president. Both D. J. O'Connor of Sacramento, vice-president, District 6, and Ed Buttner of Oakland, labor relations committeeman for the district, are up for re-election. Los Angeles Chapter has introduced an amendment to set up a veteran membership for ex-contractors who were former members.

50th birthday

"More Production Ahead" is the name Westinghouse gives a new traveling industrial power exhibit. J. A. Wagoner, exhibit treasurer, is now on the road with the show. With a model factory in miniature he shows where various power distribution equipment may be used advantageously.

Will come West

A conduit clamp by which to fasten steel conduit to steel beams either at right angles or parallel to the beam, has just been put on the market by the Kindorf Co. of Emeryville, makers of conduit hangers. It is designed for fast installation yet to be removable for plant changes.

Quick fastener

Promotion

Vic Moulton, Denver, electrical engineer with the Mountain States Inspection Bureau for years has been made branch manager of a new branch office in Albuquerque. He has been the secretary-treasurer of the Rocky Mountain Chapter of IAEI; will now be active in the New Mexico Chapter.

Thermal bond

Cadweld, a means of welding copper to other metals through igniting of copper oxide and aluminum powder in small molds that hold conductors, lugs or other surfaces together, has appointed Ken M. Ryals Co. of 461 Market St. its northern California distributor.

Standards accepted

Cold-Cathode lighting standards have finally been officially adopted by the American Standards Assn. as submitted by the Fluorescent Lighting Assn., the organization of cold-cathode manufacturers. The standards recognize two lamp types, LP for starting voltages from 450 to 750; HP for from 600 to 835; rating life for LP at 15,000 hours; for HP at 25,000 hours and over.

Learn physics!

E. R. "Al" Cornish, NECA research director, debunked the ridiculous suggestion made by the research director of the Housing and Home Finance Agency that steel wire be substituted for copper for home wiring. He declared the idea an electrical absurdity. It would take a steel wire the size of a reinforcing rod to carry the current needed for home appliances and lamps and dissipate most of the energy in heat. "No better way to burn down people's houses than to follow this idea."

Robot seeing

Industrial television, by which to see processes that would be dangerous for an observer to get near, is being licensed to use patents of Federal Telephone & Radio Corp., Capehart-Farnsworth Corp. and International Standard Electric Corp. Diamond Power Specialty Corp., which with Capehart-Farnsworth has worked it out jointly, will manufacture.

Appointee

Cutler-Hammer Inc. has appointed National Parts Distributors, 1320 Lake Shore Ave., Los Angeles, an outlet for all of its renewal parts.

Local boy, etc.

Bart K. Wickstrum has been advanced to vice-president and director of sales of Sylvania Electric Products Inc., succeeding Robert H. Bishop, who resigned to become vice-president of E. F. Drew & Co. Wickstrum joined Sylvania in 1939 after being with Hearst Enterprises and soon became Pacific Coast sales manager in 1944; leaving San Francisco to become Midwest sales manager in 1945.

Hot glass

Radiant glass heating panels for industrial applications are now being made by Corning Glass Works in a variety of characteristics to suit particular requirements, such as textile drying, lacquer drying, paper coating treatment, chicken brooding, laundry drying and electrostatic charge dissipation. Thin film of conducting material is cast into the Pyrex glass surface, acting both as heat source when energized and reflector to direct the heat. (Same type glass is used in Sylvania's radiant glass panels.)

In

Electra Motors Inc. of Anaheim, makers of small motors, has joined NEMA motor and generator, fractional horsepower and integral horsepower subsections.

Grind slowly

Seattle's new code is almost ready to submit to the city council. A committee, headed by John Majerus of NECA, made up of Electric Club of Washington members, has been working on it for 18 months.

Complexion light

Mira-Lite, using a Flolite cold cathode fluorescent lamp is announced by Mobeco Inc., of Watertown, Mass., as a mirror fixture for bathrooms, cosmetic rooms, vanity tables with special color correction and low surface brightness. It is made for either built-in installation in new houses or for fastening to any standard mirror.

Industrial

All-Brite of Fluorescent Fixtures of Calif. announces that it has received RIM certification from Electrical Testing Laboratories for a series of 2-lamp and 3-lamp 96-in. slimline fixtures, on all of which it is in position to make prompt deliveries.

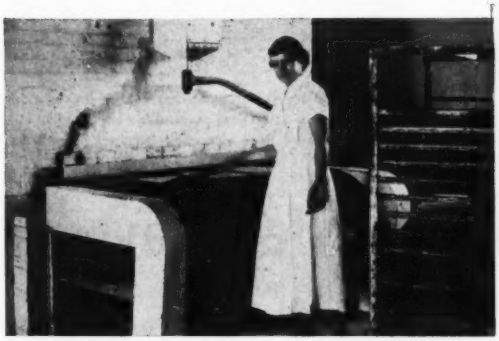
No chances

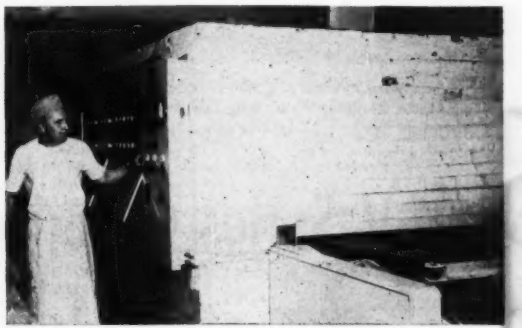
Burbank recently adopted a new electrical code, adopting NECode and state Safety Orders but requiring Class 1, Div. 1 wiring and fixtures for areas to gasoline filling pumps.

NORTHWEST ELECTRIC LIGHT AND POWER ASSOCIATION

Utilization Data Sheet No. 85

SUBJECT: Electric Bake Oven for Swedish Rye Bread
CUSTOMER: Britlbread Products Ltd., Vancouver, B. C.
TYPE OF BUSINESS: Bakery
SERVICE COMPANY: B. C. Electric Co. Ltd.
DATA PREPARED BY: R. M. Horsey, Commercial Sales Representative





Left, oven entrance, showing wire mesh conveyor belt; right, exit end of oven. Note control panel with thermometers, switches, fuses

Description

Britlbread Products produces Swedish-type rye breads using Swedish recipes. Three types are made and sold under the names of "Rye-Crunch," "Britl-Tack" and "Britl-Bread." This thin type of product requires an unusually high temperature for a short baking period. It is done electrically in an oven manufactured by the Swedish General Electric Co.

Method

The bread dough is first mixed in 300-lb batches using dark whole rye flour. It then goes to the bread rolling and cutting machine which forms cakes at the rate of 24 per minute. The cakes are then placed on racks and steam proofed at 107°F for one-half hour. From there they are placed on the continuous wire mesh belt of the oven and travel through in 12 minutes. The cakes are then air cooled and cut to size for packaging.

Oven

The oven is a 35-ft continuous-belt type with a wire mesh belt 5 ft wide. Two hundred and four heating elements are installed over and under the top layer of the wire mesh belt. They are connected in groups of three, each group being wired to a 3-heat switch. Elements vary in size from 1,430 w at the oven entrance down to 250 w at the exit. Two elements, each of 1,250 w, run the full length of the oven on either side of the belt. All elements are separately fused with a screw-type plug fuse. Total connected load is 153 kw at 220 v, three phase.

The method of connecting elements in groups of three to 3-heat switches permits a wide range of intensity of heat in the oven. In practice the entrance section operates at 340°C, middle section 260°C and exit or drying section 175°C.

Cutting to Size

After baking, the cakes are cut to size by a series of seven adjustable circular saws connected to a 2½-hp motor.

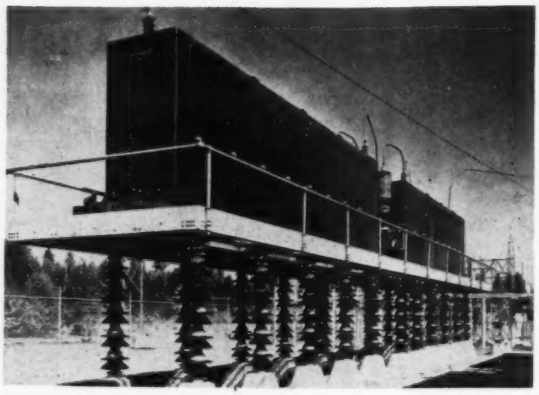
Cost of Operation

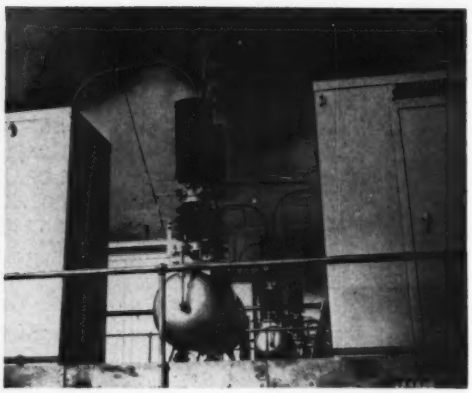
The electric oven replaced an oil-fired oven of similar capacity. With the present one-shaft operation energy cost is approximately the same as that for oil. However, over-all costs have been greatly reduced because of increased plant efficiency and the ease of temperature control. The operator, Mr. Ayley, states: "Since the installation of the electric oven the whole plant operation has become most efficient. Correct temperature control not possible with oil has stopped wastage through improper baking. Plant and equipment maintenance has been cut to the minimum. Oven maintenance costs alone previously amounting to over $1,200 annually are now negligible. I am more than satisfied with the operation of the electric oven."

Data Sheet 84 covered Infrared cooking in Ireland's Sandwich Mart in Portland, July Electrical West, page 68

Operating Data

Oven 153 kw	204 hp
Mixer	10 hp
Saw	2.5 hp
Miscellaneous motors	8 hp
Total connected load	224.5 hp
Weight of product produced in 8-hr shift	1,830 lb
Energy consumed per 8-hr shift	1,500 kwh
Energy consumed per pound of product	.82 kwh





One phase of the 230-kv BPA 25,920 kvar 3-phase series capacitor installation at Chehalis, Wash., left. The two capacitor housings in each phase can be connected in series, in parallel or used individually for different degrees of compensation. Right, each capacitor housing containing 4,320 kvar of parallel-connected 7,960-v capacitor units is protected by a porcelain-enclosed by-pass gap

H-V Series Capacitors Can Be Relayed

J. E. Barkle

Headquarters' Central Station Engineer
Pacific Coast District, Westinghouse Electric Corp.

The theoretical advantages accruing from the use of series compensation in high-voltage transmission lines to increase transmission distances and the mechanics of determining the characteristics and rating of the series capacitor have been widely discussed in the technical literature. Of equal importance is a knowledge of the effect of the series capacitor on the system fault-protective relaying, since this can have an important bearing on the capacitor location and size and on the choice of the type of relaying.

System relaying is complicated by the fact that the series capacitor is protected against excessive current and voltage by a by-pass gap that short circuits the capacitor when the capacitor voltage drop exceeds approximately 2½ times normal. Thus, depending on the short-circuit current magnitude, the capacitor may or may not be in the circuit during a line fault, and this causes a difference in the circuit impedance for the two conditions. Unbalanced faults can cause shorting of the capacitors in one or two phases resulting in unbalanced phase impedances. System transients caused by shorting and reinserting the capacitor also cause complications.

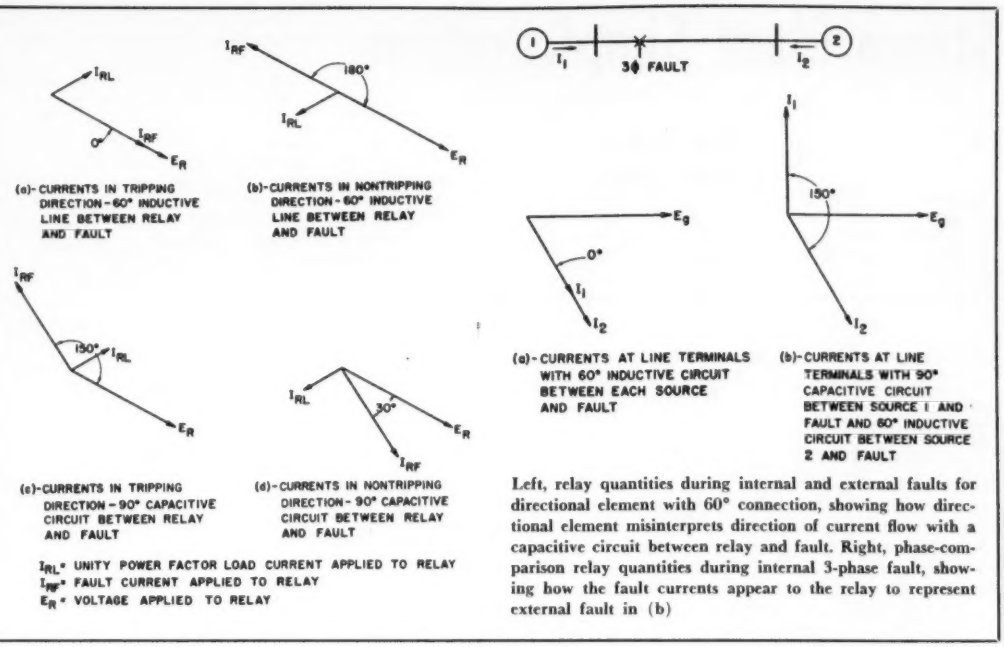
A series of analog computer studies was conducted using different circuit arrangements and varying degrees of compensation to determine proper application guides so that the system relaying might be expected to operate correctly. These guides apply in particular to those cases where the series capacitor is installed in a high-voltage system tie and where high-speed relaying is normally used.

A recent 230-kv series capacitor installation on the lines of the Bonneville Power Administration has presented an opportunity to test relaying performance under actual system fault conditions. The successful performance obtained during staged faults has substantiated the principles followed in developing these application guides.

One popular form of high-speed relaying is directional-comparison carrier relaying using impedance relays. The location and size of the series capacitor can seriously affect the operation of these relays. For faults on the opposite side of the series capacitor, the reach of the distance or impedance elements is dependent on operation of the capacitor by-pass equipment. If the capacitor voltage drop is large enough to cause shorting of the capacitor, the relaying problem is that of a normal inductive line. But if the capacitor is not shorted, the reach of the distance elements is increased by a distance equal to twice that represented by the capacitor reactance.

For example, if 50% of the inductive reactance of a line is compensated for with a series capacitor in the center of the line, a fault on the opposite side of the capacitor appears to the relay to be a fault at the relay, except for resistance. Likewise, a fault at the far end of the line appears to be a fault at the center of the line. Thus, the first question concerning the application of distance relays is whether the change in circuit impedance with the capacitor shorted out, or in the circuit, has been considered. This problem is minor for small degrees of compensation, but the settings of the first zone elements and the carrier distance elements must be adjusted to assure proper operation, unless it is assumed that the capacitor will always be shorted during faults.

Operation of the directional element of the distance relay must also be carefully considered. The fundamental involved is the fact that a capacitive voltage drop is opposite in polarity to an inductive voltage drop. If the series capacitor is located adjacent to a station bus or if the compensation is large enough to make the circuit between the fault and the bus capacitive, the bus voltage during a three-phase fault is in a phase position opposite to that found with an inductive circuit. This reversal of the



Left, relay quantities during internal and external faults for directional element with 60° connection, showing how directional element misinterprets direction of current flow with a capacitive circuit between relay and fault. Right, phase-comparison relay quantities during internal 3-phase fault, showing how the fault currents appear to the relay to represent external fault in (b)

directional element reference quantity causes the relays to operate on current flow in the nontrip direction. This possibility of misoperation of directional elements applies to all relays at that bus, whether current or voltage polarized and whether associated with the compensated line or others. Again, operation of the capacitor by-pass gap to short the capacitor causes the relays to operate correctly. Difficulty can be avoided by placing the capacitor in the center of the line and compensating for less than 50% of the line reactance, which means that the bus-to-fault reactance is always inductive.

Phase-comparison carrier relaying overcomes the two difficulties just cited for directional-comparison carrier relaying. The fault detectors in phase-comparison relays are simple overcurrent elements that are independent of the line reactance except so far as fault current is affected. Phase-comparison relays determine the fault location by comparing the phase positions of the currents at the two line terminals. On inductive circuits with current flowing into the line at both terminals, as for an internal fault, the currents are 180° out of phase, and the relays trip with maximum torque. For an external fault, the currents entering and leaving the line are substantially in phase and the relay has maximum nontrip torque.

With a large amount of compensation, the capacitive reactance may be greater than the inductive reactance to the system voltage source. For a fault on the opposite side of the capacitor, the fault current from this source will lead the voltage, while the current from the inductive source on the other side of the fault is lagging. An internal fault under these circumstances appears to the phase-comparison relays to be an external fault and the relays do not trip. If the capacitive reactance is less than the inductive reactance to all voltage sources, phase-comparison relays will trip correctly for all internal and external faults; otherwise, proper operation on internal faults will depend on operation of the capacitor by-pass gap.

In general, ground-fault protective relays are not greatly affected by a series capacitor installation. There are, however, two factors that should be checked. The first is whether the circulating zero-sequence current occasioned by single-phase gap operation is sufficient to operate residual relays falsely. A system swing or a remote 3-phase fault that operates one gap but not the other two causes circulating zero-sequence currents in directions to trip in the compensated and also in paralleling circuits. The residual relay settings must be such as to cause proper operation. The second difficulty is encountered when the zero-sequence impedance from any bus to its source is capacitive. Possible misoperation of residual directional relays must be checked when this is the case. The situation is similar to that described for phase directional elements with a capacitive circuit between the relay and the fault.

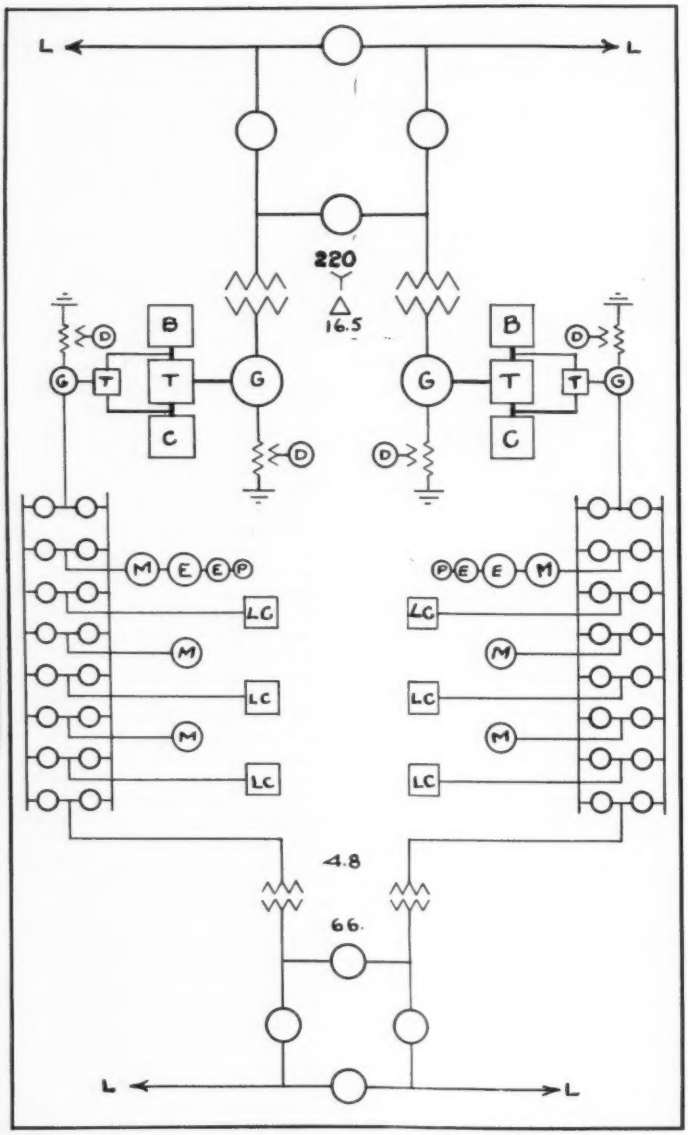
In addition to these limiting cases, there are many intermediate cases in which successful relay operation depends on the type of fault, system impedances, relay characteristics and capacitor by-pass gap operation. The phenomena described for phase-comparison relays may also occur with any differential relays whose protective zone includes the series capacitor. This might include differential relays around the series capacitor itself, or pilot-wire relays of the current-differential type. The phenomena discussed in connection with directional-comparison carrier relays, namely possible directional element misoperation and change in reach of distance elements, apply equally to directional and distance elements not involving carrier or equivalent pilot channels.

Critical examination of the transient results obtained on the analog computer coupled with actual tests on a 230-kv installation shows that correct relay operation can be obtained during faults and reclosing, provided proper consideration is given the above points. No particular need for special relay developments for relaying series-compensated circuits is envisioned.

Steam Plant Simplification

Lloyd E. Hunt

Chief Electrical Engineer
Southern California Edison Co.



Legend: B, boiler; C, condenser; D, ground detector; G, Generator; T, turbine; M, motor; E, exciter; P, pilot exciter; LC, load center; L, transmission line. LC is installed in central location for feeding 480-v service instead of using a central 480-v system

Simplicity is the keynote of reliability. That is axiomatic for things mechanical and electrical. In the opinion of the writer some of the major components of an electric utility system have become unnecessarily complicated at an unwarranted increase in cost and a decided sacrifice in reliability. This applies particularly to transmission substations, bus arrangements and the modern steam plant.

This fundamental philosophy of simplicity for reliability justifies the unit design in steam plants. Some points are here presented that it is felt merit the consideration of the steam plant designer.

A sketch is presented to show a steam plant using two large units of approximately 150-mw capacity. Accepting the modern trend of high-voltage transmission systems, it is important to feed generation into the network with large capacity units from large generating stations. The scheme shown includes two units. By doubling or tripling this layout, the plant could be of the size to meet the requirements or could be added to in order to meet increased demand.

The chain is no stronger than its weakest link. The unit type of steam plant is no more reliable than the reliability of the weakest unit. A study of all necessary items for operation is important. Taking the electrical side of the steam plant, the modern hydrogen-cooled generator operating with an ungrounded neutral has a very high reliability factor. If this factor be taken as unity, then all important electrical equipment should be compared to this equivalent.

The transformer bank may have a large range of reliability factors according to the type used, for instance the self-cooled full insulation level transformers have the highest reliability factor. If savings in the transformers are to be made by other types of cooling, consideration should be given to the actual savings based on a 25-year use. In interconnected systems, the impedance is very important to system operation reliability. When forced oil or air are employed the reliability factor may be materially reduced by the less reliable motor-driven pumps or fans with the hazard of circuit interruption of these devices. The selection of the transformer setup can thus be better or worse than the generator. Individual interpretation must be relied upon for this determination.

The exciter, the main fans, the main water pumps, etc., are of primary importance. Any interruption in these devices would cause a unit shutdown. It is important that these

units have equal reliability factor with that of the generator. If any of the auxiliaries do not have as good a reliability factor as unity, more study and perhaps more money should be invested in them to insure their greater reliability.

This same study should be made on the mechanical end of the plant. The turbine, the boiler, etc., should have the same reliability of unity. From a thorough study, it would be possible to decide where money could be saved and where money should be spent.

Duplication, and the complication of duplication, is a poor substitute for making equipment reliable. All equipment needs overhaul, the time element being determined by experience. If the plant as a whole had a reliability factor of unity, the maintenance of all vital pieces would restore the plant to good shape at this overhaul period with expectation of reliable service for the next operating period.

There are many simple ways of assuring electrical reliability. The main consideration is to assure proper insulation in all parts of the circuit. All electric windings of power house devices should be vacuum dried with pressure impregnation. The class of insulating material should be the one required to give the necessary reliability.

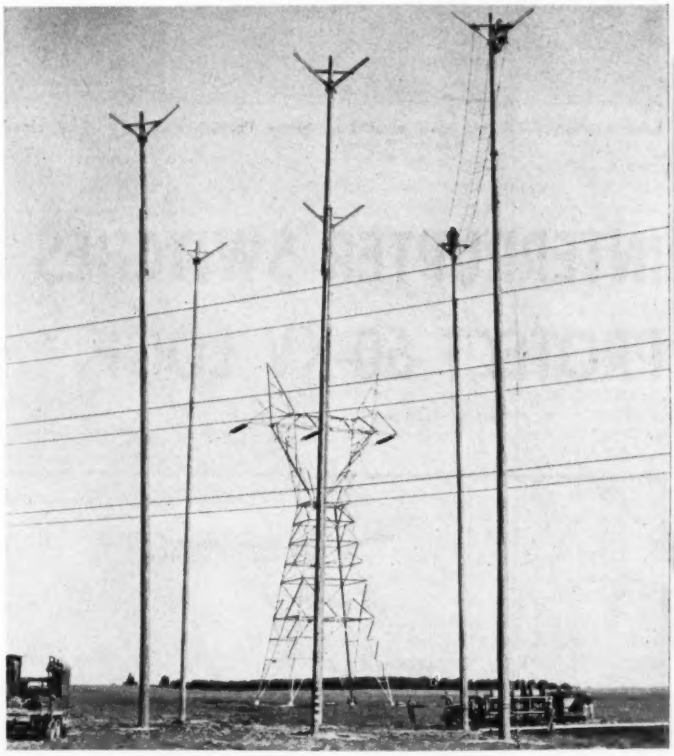
The reliability of the plant as a whole in relation to operation of the system is very important. When more plants are connected to high-voltage networks, plant stability is most important. The plant must operate at changes in voltage and frequency. If the plant is shut down by system disturbance there must be a way to start it up. This brings up the very important problem of power supply for auxiliary equipment. The extreme (the desire of many operating engineers) is the use of a complete condensing auxiliary power steam turbine generator unit. The most common method is to use the auxiliary transformer bank on the leads of the main unit. After a thorough study, it is not difficult to determine the type of auxiliary power requirements for a given power station to fit in with the operation of a particular system.

Taking auxiliary power from the leads of the generator has many disadvantages such as need for another source for starting the unit, varying voltage, frequency variation with the speed of the system and the generator may be at the electrical center when system out-of-step conditions occur. The condensing auxiliary turbine generator has the disadvantage of loss of plant efficiency and of high installation costs.

The system shown in the sketch is a compromise, one that will give excellent plant reliability and excellent system reliability. This shows an auxiliary turbine-generator operating on the main boiler and the main condenser. The turbine is built to run without steam for cooling the blades, and the generator is used for a synchronous condenser for maintaining constant voltage on the auxiliary equipment while power is being normally supplied from the auxiliary bank. In time of system disturbance the bank is tripped off, and the load is all carried on the auxiliary generator with a flat governor setting at 59½ cycles.

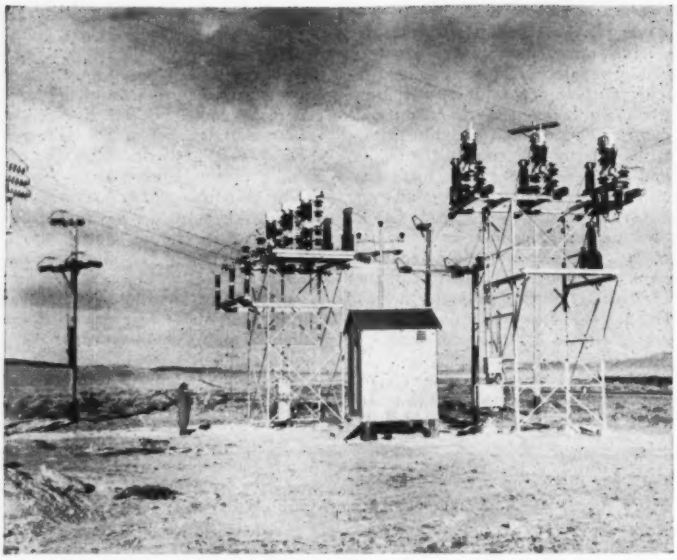
With this system of auxiliary power, the main exciter, auxiliary exciter and pilot exciters could be driven by a single motor with a great increase in reliability over direct or gear-driven exciters. When motor-driven exciters are used, the end of the main generator could be sealed directly, having that bearing in the hydrogen shell. This slightly increases the reliability of the generator.

The switching means are simple, as previously described. One simple rule has been carried out for flexible and reliable operation; that is, every important device is connected by the means of two switches. A thorough study using these principles will result in a more reliable station, and a more reliable system, because the money spent to improve one portion will be more than offset by savings.



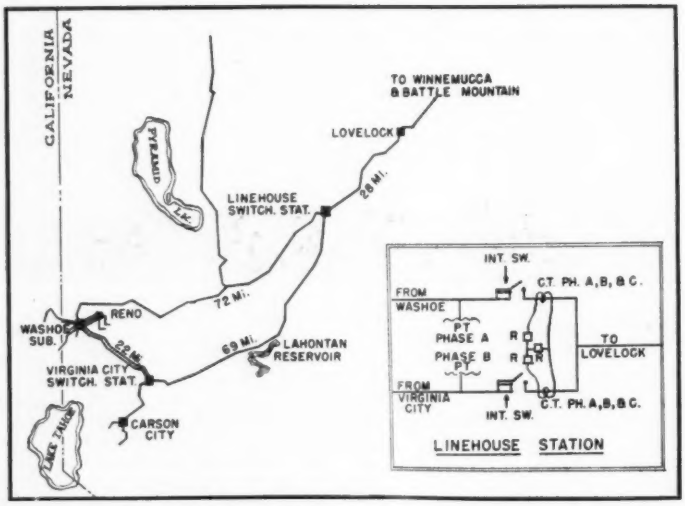
Hot Crossing

Hazardous crossing over Pacific Gas and Electric Co.'s double-circuit 220-kv Bucks Creek-Bellota line while energized was accomplished without incident during construction of the USBR's 230-kv Shasta-Tracy East Side transmission line. The point of crossing, near Sacramento, Calif., is a 628-ft span between two 125-ft towers. Wood pole guard structures 135 ft high were built on either side of the energized circuits. A protective rope net was stretched by first pulling across a small grounded chalk line, then larger lines until sufficient support was provided. Three aluminum conductors and two steel overhead ground wires were strung in this way by A. S. Schulman Electric Co.



Load interrupter switches open parallel on Sierra Pacific's long 60-kv loop circuit

INTERRUPTER SWITCHES PROTECT 60-KV LOOP



Northern Nevada system of Sierra Pacific Power Co., showing arrangement of 60-kv lines

A switching problem on a long 60-kv loop was economically solved recently by the Sierra Pacific Power Co. of Reno by the installation of two automatically controlled reclosing interrupter switches at its Linehouse substation. This station is part of a 60-kv tie and feeder system constructed to improve service and provide additional capacity for the mines and communities of northwestern Nevada. The problem and physical arrangement of lines are shown by the accompanying sketch.

A new line in the system consists of 72 miles of 60-kv H-frame transmission line supplied for the company's Truckee River system west of Reno and terminating at Linehouse, located in the desert 28 miles southeast of Lovelock, Nev. Maintenance and operating crews are available at Lovelock.

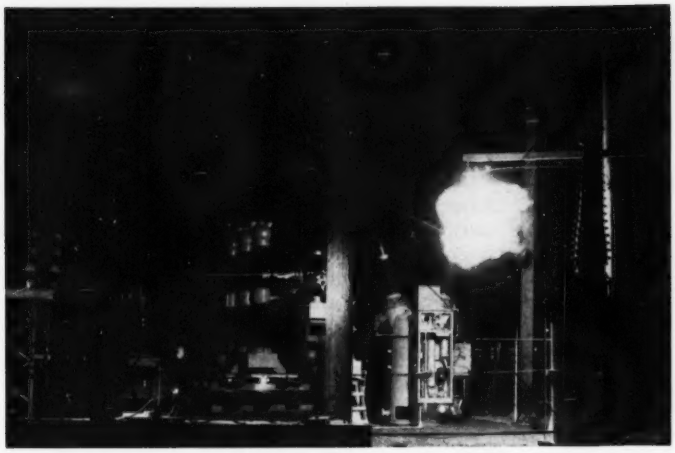
Switching Scheme

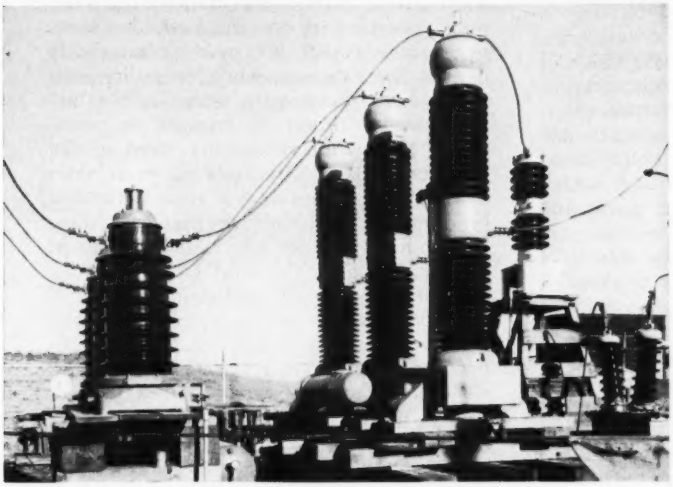
The switching scheme is developed around two Schwager-Wood 69-kv, 250,000-kva interrupter switches equipped with spring tripping mechanisms and a-c motor closing devices controlled from 24-v d-c relaying circuits. Reverse power protection of each of the two incoming lines is provided by conventional relaying equipment as is overcurrent protection of the outgoing circuit to Lovelock. One line-to-ground 34-kv potential transformer and three current transformers are provided on each supply circuit.

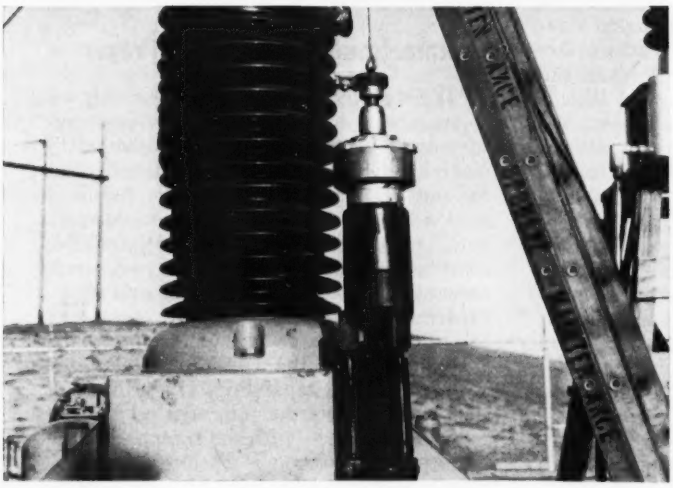
Following a fault on either of the supply circuits, the related interrupter switch will open on reverse power and remain open until voltage on the circuit may be successfully restored from the sending end, after which the interrupter will automatically reclose, its motor being energized from its related potential transformer. The interrupters have had occasion to function several times and have performed very satisfactorily.

Economy Important

Because of the relatively long distribution lines and small loads developed in this sparsely populated region, economy must be considered both in investment costs and in operating expense. Opening of the 60-kv loop was too severe a duty for conventional 60-kv air break switches, even with the late quick-break feature, and loads and circumstances did not warrant the expense of a regular oil circuit breaker. It is estimated that construction costs of the station were reduced 25% by the use of these interrupter switches instead of conventional oil circuit breakers.







New-Type German Breaker Tested At Spokane

A new-type 115-kv low-oil-content circuit breaker, the Siemens Schuckert developed in west Berlin, Germany, was tested recently at the Spokane substation of Bonneville Power Administration.

This 3-pole breaker works on the principle of smothering the arc with a minimum amount of oil to give economy of operation and to decrease fire hazards. It is made up of three rows of hollow insulator stacks where the interruption chamber and arc contacts are located. Compressed air opens the contacts, the fault arcs are extinguished in oil and the hot gases expelled from the chamber.

In line dropping and fault tests compiled by the Siemens Schuckert Mfg. Co., rated values were given as 110 kv, 2,500 mva symmetrical, 600 amp, minimum reclosing time 12 cycles, fault duration about three cycles.

The Spokane tests were to show the ability of the breaker to interrupt charging current of lines of various lengths without restrikes and to interrupt fault currents up to the capacity of the 115-kv network available at the substation (about 2,800 mva symmetrical) with different degrees of offset. Arrangements were made to part contacts at different points on the current wave in order to obtain a major loop of current just before interruption of fault current. This was to impose maximum interrupting duty on the breaker. All high-capacity tests were made single phase. There was one 3-phase ungrounded fault test at a low fault current value.

Apart from some mechanical troubles with the tripping device which were overcome before the heavy fault tests began, the circuit breaker made a good performance. With more than the rated interrupting capacity, it cleared all faults in slightly more than three cycles for straight open duty. However, it did not satisfy the requirements of no restrikes in opening charging currents of short high-voltage transmission lines.

Top: test set-up and flash from one of the arc-to-ground testing faults. Center: current transformer, breaker, potential device and a second current transformer for instrumentation. Bottom: interruption chamber being lowered for disassembly, inspection

ELECTRICAL WEST

The Bread of Light

THESE be days when use must be made of both the materials and tools at hand. While development goes on constantly, most research and experimentation is beamed toward the mobilization effort. Little if any is aimed at civilian application, at least until the critical materials situation is eased.

Lighting, at the beginning of its season, in 1951, therefore is confined to re-use of the methods and materials that are current. Where the most lavish use of lighting is made is in the defense production industries. Most of them, having learned the value of high levels of illumination for improved production, are adding industrial fixtures to increase the wartime levels, sometimes double them. All the techniques of local high-intensity illumination for extra critical seeing tasks, the use of light reflecting paints and surfaces, the control of brightness ratios, are being employed in industry these days.

Office lighting, too, no longer needs to be argued about. Higher levels, lighter interior and furniture finish, are recognized to be as necessary to office efficiency as sound and air conditioning.

The schools, as articles in this issue and in previous ones imply, are becoming lighting conscious. While some modern architects still waste considerable taxpayers' money designing and having installed some rather expensive experiments in complicated daylight control methods, there is reason to believe this will again prove the truth of the reliability of well-designed electric illumination as against the varying daylight. We were to have covered the results of tests being conducted of such a situation in this issue but the final data are not yet available.

Street lighting learned a lesson from the dimouts of the last war and today almost universally new street lighting is being installed. No longer is it the old ornamental post with dubious lighting that is being installed. New fixtures designed to put the light where it belongs—on the street—are being chosen, thanks to the help and education given civic officials by the utilities and the IES.

Competition for business has given store lighting its greatest impetus. Merchants have vied to make their goods most attractive, employing light to dramatize and to enhance. First the big stores have seen the light, specialty shops perhaps even ahead of them, then the smaller stores have followed suit to compete with them. Only the strict limitations on commercial construction now holds back still further development of techniques in this field of lighting practice.

The home, however, has suffered a decline in illumination practice. During the war hardly any effort was made to teach the public the need for and the methods whereby homes could be more comfortably lighted. Since the war only a few utility companies have resumed the home lighting activity which almost all engaged in previously. Meanwhile decorators, tired of the "old look" have introduced an even older look of the nineties as if it were something brilliantly new. Housewives prone to follow fashion have gone for it because they wanted change and color. The result has been a style pattern of dark walls and ceiling, lovely in color perhaps, but making comfortable interior illumination very difficult. In this number one program to reach the public and show ways to light small houses is told. Many more such programs are badly needed.

Lighting has always been the bread of the electrical industry. And it will continue to be.

Rain from More Than a Prayer

FIRST really large-scale cloud seeding for increasing hydroelectric power resources may occur in the tinder-dry and water deficient Pacific Northwest during the current fall and winter. Bonneville Power Administration last month signed a $7,500 contract with a Denver organization, Water Resources Development Corp., for a two-month survey and study of the economic and physical feasibility of rain-making operations over the headwater watersheds of the Columbia.

To utilities in the Far West with large hydrogenerating capabilities, the outcome of such large-scale tests can be epochal and significant. To date—with the exception of the admittedly controversial upstate New York

EDITORIAL VIEWS

experiments—most of the rain-making operations have been highly localized. Success has been mixed. For every apparently fortuitous hit there has been an equally dismal failure. California Electric Power Co. experiments in the High Sierra have been successful. So have some tests in Arizona and New Mexico. In other states and in Hawaii experiments have been negative.

However, if cloud seeding can demonstrably produce extra precipitation at critical periods over extensive watersheds, then there is hope that future hydro power shortages may be decreased in intensity, if not eliminated entirely. The BPA cloud seeding experiments will be watched with interest and hopeful anticipation.

Put Up or Shut Up

TO AN increasing degree—and whether they like it or not—the affairs of professional engineers and the engineering profession are becoming more and more involved in politics and legislation. Part of this stems from the fact that in practically every Western state engineers are licensed and registered under state statute; part from the increasing technological complexity of modern civilization.

The extent of engineering interest in legislation is demonstrated by the experience of the California Legislative Council of Professional Engineers. During the 1951 legislative recess the council met and reviewed approximately 80 bills affecting engineers and engineering. The council's legislative representative was instructed to oppose 30-odd bills and of these only four passed, all amended to delete in most cases objectionable features. Without such a close watch on legislation, there unquestionably would have been new measures or amendment to existing statutes which would have been undesirable.

Experience in other state capitals during the year has been similar. Organizations such as the California Council are performing a necessary and valuable function and merit both moral and financial support from all branches of the engineering profession. Unfortunately this kind of support has not been forthcoming from the electrical engineers—at least in California. Interest has been nominal, support only half-hearted and financial backing meager.

Whether they like it or not—and there are many who don't—the electrical engineers are in the legislative bind just like all of their professional brethren. For their own salvation and self-interest they should fully support the California Council and similar agencies in other states.

GOVERNMENT was never designed to operate a business. Measured by the standards of business principles, government has never been successful in its proprietary undertakings. The absurd understatement in preliminary estimates, the exorbitant construction costs, and the almost complete failure of federal projects to meet the rosy promises of financial return have amply demonstrated the inefficacy and inefficiency of the business ventures of federal departments, commissions and bureaus . . . Where lies the blame for this deplorable shift from the founding fathers' delineation of government in the Declaration of Independence and the Constitution? Let's not put the responsibility on our representatives in Congress who respond to the demands of their constituents—or else! The force motivating this digression from the freedom of the individual is found in mass public opinion, nurtured carefully by the group of men in and out of government who, operating as the Fabians did in Great Britain, have inculcated in our people, through skillful propaganda and the artificial arraying of class against class, the willingness to accept federal gratuities and subserviance to bureaucratic controls and regulations. Let me . . . again remind you that freedom does not abide; it must be preserved.—George M. Gadsby, president EEI, and president, Utah Power & Light Co.

"Miss Million TV" (Miss Marilyn O'Connor), the millionth set, its winner, R. T. Knight, salesman, and Dick Lane, MC for the celebration of Los Angeles Electric League over it

L.A.'s Millionth TV Celebrated

When Los Angeles passed the million-set mark in number of television receivers, the radio-TV industry made the most of the occasion. Electric League of Los Angeles did it in true Hollywood style, climaxed by a big celebration at Earl Carroll's Restaurant for the dealers of the area. Civic dignitaries, star performers from the seven TV stations, TV industry executives, and even the president of the Radio Television Manufacturers Assn. from Washington, D. C., participated.

The event climaxed a week of publicity in which a queen was selected and a drawing for TV salesmen was held for the prize of the official 1,000,000th set.

Glen T. McDaniel, new president of RTMA, a vice-president and general attorney for RCA Communications Inc., debunked the importance of the slump in set sales. He said, "the difference between TV and other consumer durable goods is accountable to the susceptibility of TV to Regulation W." This and the artificial government-imposed freeze on new TV stations, he said, which limited sales opportunities. For the market for TV is abnormally sensitive to anything that affects the pocketbooks of people in the medium and low income brackets.

McDaniel also dealt with other TV problems, such as credit restrictions, material scarcities, the freeze on TV stations and color. In each case he pointed up the opportunities and the tremendous future for TV sales.

He predicted that TV will have an ever-increasing prominence in national and international affairs. The intense interest the public displayed in actual watching of the crime inquiries and the telecasting of United Nations sessions were proof of this promise. When the freeze is thawed there will be 2,000 stations instead of the present 107.

Glen L. Logan, manager of Los Angeles Electric League, announced a survey proved the existence of 1,001,874 receivers in the Los Angeles signal area as of the date of the meeting. The official one-millionth set, donated by a pool of many manufacturers, was won by R. T. Knight, salesman, in the drawing made by "Miss Million TV" (Miss Marilyn O'Connor, model). Dick Lane was MC for the star show of TV performers from all stations. Honored guests included Mayor Fletcher Bowron, Police Chief William Parker, Dr. Alexander Stoddard, superintendent of schools; Leonard Roach of the board of supervisors; Oscar Trippet, president, Los Angeles Chamber of Commerce, and Haan Tyler, vice-president, Television Broadcasters Assn. An imposing opening ceremony was presented by an honor guard of the armed forces. Jack Hargrove, president of the league, was official host.

On Sept. 27 a big meeting, Appliance-Television Industry Day, will be a retailer clinic in the afternoon, a banquet with Sam Vining as speaker in the evening, at Hollywood Roosevelt.

CCAA

A new dealers' association has been formed in Contra Costa County, the Contra Costa Appliance Assn. It has elected B. Siomontacchi of Crolone Furniture Co., Crockett, as its president and Dell Kramer of Rodeo as its vice-president. Secretary-treasurer is Chester Brunnelle of Concord Electric Co. The association has both a gas and electric unit and Jim Keyes, Coast Counties Gas & Electric Co., represents the gas unit and George Schutz, PG and E, the electric unit on the board. Directors elected are Frank Gularte of Brentwood Electric, Ralph Huffman of Martinez Furniture Co., Andy Maser of Thompson Electric, Walnut Creek, and Claxton White of Pittsburg Electric. The organization has committees on electric appliances, wiring, lighting and education.

AAD

Officers leading the Association of Appliance Dealers of Seattle are arranged in pairs so that when one cannot preside the other can. The twin chairmen are Tom Carmichael of Burns & Carmichael and Jim Rench of Sherman Clay & Co., Seattle. On the board are W. B. Clibborn of Case-Littel, Ward Davison of Davison's, J. D. Gawne of Seattle City Light, Boyd Giles of Frederick & Nelson, Don B. Nelson of Don B. Nelson Appliances, and C. O. Paget of Hopper-Kelly. The organization, according to L. Edward Smith, secretary-treasurer, will begin meetings in September to map out promotional programs for the fall.

P & K

R. T. Struble, Meier & Frank Co. housewares buyer, was recently elected president of the Portland Pot and Kettle Club, succeeding H. F. Wisher of James Stack Co. J. E. Moylan, Vinton Co., is first vice-president; Harry Otterstrom of Kleinerts, second vice-president; Jerry Shaw, Universal Carloading Co., treasurer; J. W. Stewart, recording secretary; Tom Kindman, Woodbury Hardware Co., corresponding secretary.

ELECTRICAL WEST

Sales Guide

News Letter

FOR THE ELECTRICAL MERCHANT OF THE WEST

September 1951 ©

While big news of the month was the coast-to-coast telecast of the Japan peace conference on the new microwave relay net just finished, of more significance to most dealers in the West was an upturn of sales again, not only in TV sets but in white goods. Sales in July and August improved generally, verifying earlier estimates that the business was merely returning to seasonal trends after many upheavals.

Upturn again

Production of new appliances and radio-TV was cut back strongly, at rates far less than current sales. Latest moves of NPA were to reduce steel, aluminum and copper allotments to the appliance and civilian radio-TV industries still more than the predicted. The copper mine strike didn't help any. And defense production is just starting now.

Scarcity forming

Relaxation of Reg. W did not start any wild rush of buying anywhere, but it is helping with sales of major items by putting purchases within reach of more low income families. However, a rash of crazy trade-in offers drew criticism from Better Business Bureaus, trade associations and threats from the Federal Trade Commission to clean up such misleading and dishonest advertising. A black eye to the industry!

Uneasy payments

Fair Trade word battle goes on and there are three bills before Congress--1, an anti-fair-trade; 2, to validate the nonsigner clause; 3, that and also that contracts under Fair Trade won't violate Federal Trade Commission Act. Fair Trade found itself in a bind between Supreme Court decision and interpretations of anti-trust laws by FTC, which has been searching for a point to attack and break it up. Attorney-General McGrath threw in a pitch, threatening anti-trust prosecution. Whether a manufacturer can legally refuse to sell to a dealer who doesn't sign, is the question of "restraint of trade."

No cease fire here

Sunbeam's president B. A. Graham sent out a request to dealers who haven't signed a contract to adhere strictly to its resale prices or cease advertising or using Sunbeam's name, trademarks, brands or goodwill, either directly or indirectly; said they must obliterate trademarks from products and cartons, destroy guaranty cards, printed matter. A dealer may sell as he chooses but no court has given him the right to misuse Sunbeam's name, etc., for his own profit, said Graham.

Ultimatum

American Fair Trade Council release said that "grapevines" report Macy's building up big inventories as ammunition for a gigantic price war to break sometime in September. . Another strongly denounced any collusion by producers or resellers to fix prices illegally.

Price war No. 2?

TV scanned

Transcontinental TV is a success. Advanced a month to telecast the Japan Peace Treaty conference opening in San Francisco early in September, the World Series baseball games are assured in October and the sponsor, Gillette, is preparing tie-in window and other ad material for dealer use. Should be the biggest sales booster ever staged. . A believe-it-or-not--A Shelby, Mont., radio man claims he got good TV reception from Los Angeles and San Francisco in Montana during an intense lightning storm. . Westinghouse Electric Corp. will pay $2 million to telecast 19 football games this fall over networks. . FCC granting of higher wattages to existing stations promises more fringe area business. . The freeze still hasn't been thawed for new stations but the prospects look bright--if equipment can be obtained to build new stations. . Paramount Pictures is really getting into TV. In L. A. it has filed for permission to test its telemeter system of showing top grade movies. It showed FCC a new color tube. And it has something else up its sleeve that's big. . Dun & Bradstreet estimated there were between 900,000 and 1,150,000 new TV sets in dealer stock Aug. 1, radio sets 1,400,000 to 1,700,000 of which about 400,000 were portables. Purpose of the survey is to advise manufacturers on production.

Price cuts

Price cuts were made on TV sets, either to move old models or in bringing out new models by a large number of manufacturers, i.e., Admiral, Arvin, CBS-Columbia, G-E, Hoffman, Hallicrafters, Motorola, Philco, RCA, Sentinel, Sylvania. The cuts are being featured in their ad programs. Zenith, Scott, John Meck, Stewart-Warner have made no cuts so far. DuMont cut cost to dealer on a few sets to move them, but not selling price. OPS was asked by DuMont, Capehart, Philco and Zenith to set retail ceilings. Most makers have been holding showings of new models for fall and winter sales.

Color slave

Admiral is offering CBS color if it is wanted. At McCormack & Co., Admiral distributor, showing, Aug. 26-28, 11 new radio and TV models were shown, the TV sets featuring 20-in. tubes; the color converter to b&w offered at about $25 installed; a color wheel for about $100, reducing the picture to 10-in. A slave color set about 25-in. wide to accommodate the 22-in. wheel necessary to give a 10-in. color picture, which with a lens is magnified to about 12-in. appearance. The slave set itself sells for $350 to $400.

1952 lines

Emerson is trying out a 2-year guarantee plan promising to refund the price of a TV set if traded in for a color model within two years from original purchase. Reaction is being tested in New York. Emerson has reduced its models to 15. . Packard-Bell has a new 24-in. model, in five cabinet models. . Philco has announced 27 radio models and 28 TV set models in its 1952 line, featuring a "tube-saver" in the radios and an ultra-sensitive Colorado tuner in its TV chassis, priced from 199.95 to $800. . P. M. Sloan, Westinghouse TV manager, at a L. A. distributors meeting showed 16 TV and 10 radio models for the 1952 line. . . Magnavox is setting its sights on a 20-in. line, it says, but has a Holiday model with 17-in. tube at $298.50. . Motorola with cuts of from $50 to $100 has 16 new TV sets and features a new anti-glare process and built-in UHF.

In focus

DuMont is organizing the TV industry to get together and buy rights to big fights, games, etc., before theaters buy them to pipe by co-ax cable to theaters only. Another competitor of these rights is Skiatron, a subscription TV system. . NBC has bought rights to the Rose Bowl games for next three years on an increasing scale. . Frank Barnes of G-E told the IRE convention that G-E is set up for full production of UHF transmission station equipment in 1952 if channels unfreeze.

"Give Electric Housewares—First Choice for Every Gift Occasion" will continue to be the theme for the 1952, as it was the 1951 electric housewares gift campaign of NEMA's section. A "How-to" merchandiser brochure to aid dealers to make the most of opportunities to sell electric housewares for Christmas and every gift occasion is being distributed by manufacturers who are members of this section of NEMA. — Continue campaign

Seems we were wrong about Herb Names. All he did was move to a new store at 4730 E. Colfax, Denver, where he opened with orchids for the ladies and Servel refrigerators. — Our error

Thompson & Holmes has been appointed distributor in northern California for the James Dishwasher line, made in Independence, Kan. It is an automatic portable that sells at $199.95; later an under the counter model at $259. — Dish 'em out

Coolerator Co. has been bought by International Telephone & Telegraph Corp. from Gibson. It includes the line of refrigerators, home freezers and electric ranges. IT&T also owns Capehart-Farnsworth Corp. — Sold again

General Electric Co. has applied to OPS for price increases for its entire appliance production, including Hotpoint, under CPR 22, not the Capehart amendment. OPS has sent out warnings that squads of enforcement men are in the field checking dealer prices. — Ups

Schick has opened two new service branches, one under Rex Lewis, in the Security Bldg., Long Beach; the other under Gerald F. Gates, in the Birks Bldg., Vancouver, B. C. Its Denver office recently moved to the new Commonwealth Bldg. — New branches

Mrs. Margaret Hyland becomes the new Oakland branch home economist for Frigidaire. Molly Sylvester has left to continue with advanced home economist studies at Cornell University. — Will miss this Miss

Bureau of Home Appliances of San Diego County had to shift the date of its fall conference from Sept. 11 to Sept. 25 because of an American Legion convention. Plans the usual high powered noon-to-10 p.m. jam-packed sales session, the afternoon for management, evening for salesmen, with many outstanding national speakers. Also in preparation is the annual Home Appliance Show in Balboa Park, Nov. 23-28. In progress now is a dryer campaign much like the ironer campaign last spring, with Apex, Bendix, Blackstone, Frigidaire, Hamilton, Hotpoint, Kenmore, Temco and Westinghouse in it. Gordon Dawson has just been elected president, George Stoltenberg and Ted Williams vice-presidents and Sam Hall treasurer. The TV Retailers Advisory committee and Better Business Bureau have distributed 20,000 "TV Facts" booklets. — Three ring circus

Electrical Wonderland Exposition opened in San Francisco Sept. 7 to huge crowds including many visiting delegations to the Peace Conference. Full details and pictures next issue. — Zooms

Electric League of Los Angeles, on Sept. 27, at Hollywood Roosevelt Hotel, will have its big meeting of the year, "Appliance-Television Industry Day," with a retailer clinic from 1:30 to 5 p.m., in which a prominent retailer will act as moderator and dealers (only) will let their hair down. The dinner meeting will be addressed by Sam Vining of Westinghouse and some other notable speaker. — "Bull session"

Seattle Appliance & Music Assn. opens its fall meetings with Otto Brandt, gm of radio-KING, speaking on "Television," Sept. 11. — Kick off

To sell residential fluorescent packaged units, Markstone Mfg. Co. of Chicago has a compact, lighted, Markstone Automatic Salesman display 24-in. wide, that can be used on counter, in window or on a wall. Makes these residential fixtures packaged traffic items for quick sale. — Packaged light

"What to Do in '52" is the theme of the Intermountain Electrical Assn. annual conference at Newhouse Hotel, Salt Lake City, Sept. 21, W. A. Huckins, Utah Power & Light, chairman. Besides a trip to see the utility's new steam plant and operations center building, a fast sales stimulating program of speakers is planned. . IEA recently had a successful 3-day freezer school; its Provo chapter put on its first all-city electric appliance show last month. — And how!

Denver is in the midst of an ironer campaign, sparked by the Dealers and Builders department of Public Service of Colorado. The company runs big ads telling the public to get a demonstration at their dealers'. Ed Steil reported 21 sales by dealers one week, more than 470 sold thus far in the campaign. — Press on

Phoenix too has a big TV Show coming up, Sept. 24-26, with a goal of 2,000 sets for September in a one-station city. Heading it is Leo "the TV King" Middleton, who will have some Hollywood TV stars. — AMA doings

Telechron introduced its fall and winter clock special models to distributors meetings in the West in late August, using a "magic" act as the theme. A. F. Fisher, Telechron's general manager, R. T. Woodward, marketing manager, and M. J. Dunn, clock sales manager, magician L. Roy Neal and a couple of cuties, showed there was sales magic in clocks. New models featured were Personality, which can be decorated to fit anyone's own ideas, Tiara, Swarthmore, Nocturne, Aladdin and Mirolarm. — Wakeners

Servel's price increases, spoken of last issue, must have slipped a decimal, for they averaged less than 3% for the line, instead of 30%. — Blush!

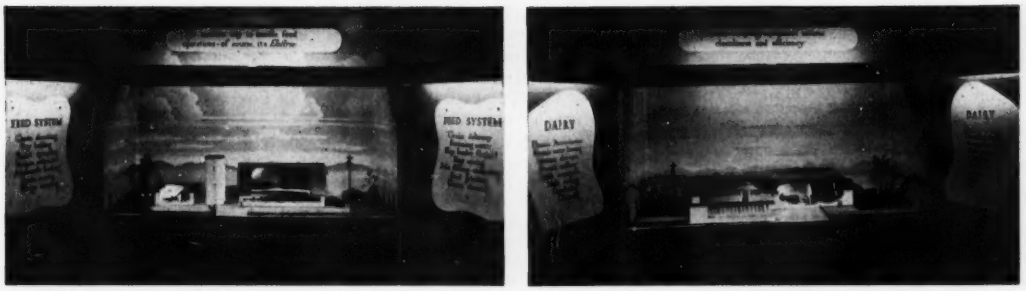
Crosley has opened up its bag again for the biggest of all giveaway contests, some $3 million total, a half million in cash, with local and national contests. Theme for essays is "What the American Way of life means to me." . Other contests--Kelvinator, which will give away Nash Ramblers for letters saying why they like Kelvinator. . General Electric with Pillsbury Mills will have a national baking and recipe contest with merchandise prizes totaling more than $50,000. As the season gets warmed up, look for more contests and giveaways. — Big giveaways

Dnapfreeze has brought out a new line of freezers adding a foot or more of cubic space for no increase in price. Thus the 6 is a 7, the 12 a 13, 16 a 17 and 20 a 23. Six new models, four de luxe, and a gadget, the Menu Maker-- four 1-pt colored aluminum containers. — More for same

Thor has added an automatic to its line. It is the semi-automatic washer with full automatic controls, will sell at $299.50. It also put into effect a five-year protection plan on its sealed mechanism of its spinner washers, promises a similar one on wringer types. — All auto

Toastmaster has announced that material shortages will mean its allocations of stock to dealers will have to be reduced. — Tighter

Hotpoint has a number of promotions going--One is of 50 installed dishwashers to winners of a letter contest; a successful formula for the sale and installation of complete kitchens and laundries, put on sound slide films; dishwasher demonstrations. — Many irons



Miniature farm layouts show electrical uses in various kinds of farming in the Utah Power & Light farm tent that plays the fairs

Pioneers Observe Farm Electrification

It was Farm Electrification Week, Aug. 26-31. The privately owned utilities of the West which had brought farm electrification up through the pioneer period, celebrated it appropriately. Who had better right to? Long before the politicians had appropriated rural electrification as their own creation, the private companies of the West had been delivering on it. The percentage of farms receiving electric service to the total had been brought as high as 98% in some instances, was more than 90% in the areas served by private utilities almost exclusively.

Both to celebrate the extent of farm electrification on their systems and to promote even more diverse uses of electrification of farm tasks, advertising, radio broadcasts, fair participation and other methods were being used. Some of it was accelerated for Farm Electrification Week, some of it was just part of a continuous program that has been going on for years. A quick summary of what various Western utility companies were doing about it as this went to press is significant:

California-Pacific Utilities

"Our managers are distributing to all farm electrification leaders, newspaper editors and community-minded individuals and organizations copies of the *Sixth Report to the Nation on Electrified Farming*. Contacts were being made with farm bureau and grange leaders to acquaint them with progress made in rural electrification —that the company has added nearly 1,000 rural customers during the last 5½ years, which represents a 60% increase in the number of farm customers served. Local newspapers were informed that the company's farm electrification program, in many cases, has extended service to almost 100% of the farms in the service area. All districts are making every effort to serve all farms within reach of company lines within the feasibility allowed by the rules of the various public utility commissions."—*E. A. Nickelsen, commercial manager.*

Central Arizona Light & Power Co.

"Besides special newspaper ads, radio commercials on its regular radio shows, drop-in slugs in other advertising, the company planned: (1) Two *At Home on the Electrified Farm* broadcasts over KOY. These were on-the-scene broadcasts highlighting the work electricity performs on the farm. (2) Two film programs on electrified farming, on KPHO-TV. These films were also to be shown to farm bureaus, clubs, 4-H groups. (3) A TV Reddy Kids show in which children extol benefits of electric living on a farm. (4) A farm luncheon with local press and radio officials present. Brief talk on farm electrification and possibly a film. Farm Bureau cooperated on this as well as FFA and 4-H. (5) Publicize the CBS Farm Electrification radio program."— *Don Willis, general sales manager.*

Coast Counties Gas & Electric Co.

"We have two county fairs in September and it is our intention to assist the 4-H exhibit and also to display a new mobile unit substation, which is intended to impress the farm people with the real interest that a privately owned utility takes in better service to them."—*R. L. Hayden, vice-president and regional manager.*

Colorado Central Power Co.

"Our rural newspapers will carry the ECAP Rural Electrification ad prepared by N. W. Ayer & Co. This four-column ad tells the private utilities' part in farm electrification. Newspapers will be supplied with a story along the same lines that tells the public the part we have had in bringing modern living to our rural customers. Show windows in all our offices will have displays for the occasion. Miniature farms, fully electrified, were built by our farm engineer to show how electric energy can do the many jobs for the farmer. Distributors are decorating show windows and displaying their electric products during the week."—*Lawrence L. Gann, commercial manager.*

Pacific Gas and Electric Co.

"O. R. Doerr, vice-president in charge of sales, will participate in one of four national radio programs, speaking of the part that the private utility companies have played in furthering farm electrification. PG and E's own record goes back to 1895 when, after building the Folsom hydroelectric plant, power was transmitted 22 miles to Sacramento and electricity was used to pump water for farm irrigation. In 1912 the company fitted out a railway car, he will tell, devoted exclusively to demonstrating the use of electricity on the farm. On it were a small pressure water system, an automatic pump, a motor-driven cream separator, a small ice-making ma-

chine, an electric washing machine, a vacuum cleaner and an electric sewing machine.

"The company's advertising featured its winning the Frank Watts Award. This advertising has run in all daily, weekly and farm publications. In August too the company's contribution to the Central Valley Project and to agriculture was advertised. *PG and E Progress* carried feature stories. Dealer bulletins announced the week and urged tie-ins. Window display cards were used in all company offices. Talks were given to service clubs on the company's rural electrification accomplishment."—*E. G. Stahl, manager, agricultural sales.*

Crowds viewed the UP&L educational miniature farms in the tent used at all fairs

Pacific Power & Light Co.

"Advertising of the company's long record of farm electrification in the areas it serves was run in local papers, with special ads and copy in the Yakima papers."—*D. B. Leonard, assistant general manager.*

Puget Sound Power & Light Co.

"Our activities will be straight publicity. These will be window cards in color, with *Puget Power Pioneers Farm Electrification* for its 33 local offices. Reproduction of the card and a story will appear in the August issue of the company's employee paper, *Puget Power News*. A news release will be sent to 10 dailies and 50 weeklies in the operating area. It will stress the company's leadership in farm research and the devices developed for the farmer. A photo of the most recent development, an electric field bulb counter and buncher, taken a few days ago while being thoroughly tested at the warehouse of a large bulb grower near Puyallup, will be released with the story on farm electrification."—*T. K. Dimmitt, farm electrification director.*

San Diego Gas & Electric Co.

"We are enthusiastic about celebrating Farm Electrification Week in this territory. 'Doc' Holloway (now president) started rural electrification in San Diego County in 1911 and we have taken great interest in this activity ever since. Our program will consist of: (1) Special edition of the *Southern California Rancher*, mailed to 10,000 in the area. (2) Personal interviews with some of the old-time ranchers, twice daily on our *Home on the Ranch* radio program. (3) Paid ads in metropolitan and rural newspapers. (4) Special window displays and newspaper publicity."—*P. P. Pine, power sales manager.*

Southern California Edison Co.

"The entire month of August has been devoted to this effort. A series of advertisements in 200 newspapers, telling the advantages of farm electrification were run, tying in with the Farm Electrification Week. An outline of activities to be undertaken in all divisions and districts was prepared, together with suggestions for luncheon club and other public talks, radio programs, etc. Window displays, booklets, stories in *Electrical Times*, a company consumer magazine, were all a part of the program."—*H. C. Rice, sales manager.*

Utah Power & Light Co.

"George Gadsby, president of Edison Electric Institute and of Utah Power & Light Co., broadcast a farm electrification message, Aug. 28, from 7 to 7:15 p.m. on the Intermountain Radio Network. It reached out from stations KIFI, Idaho Falls; KVNU, Logan; KLO, Ogden; KALL, Salt Lake City; KOVO, Provo, and KOAL, Price.

"The Better Farming Electrically tent has been displayed at all fairs and agricultural celebrations the entire year with new display this year, making use of nine miniature farm set-ups showing various farm uses of electricity. A concise pictorial booklet on these uses of electricity, illustrated by pictures of the miniatures, has been distributed to those visiting the tent. Rural Electrification Week is featured on the back cover.

"In the late spring the company also used seven-minute commercials on one of its television shows featuring the various applications of electricity to the farm. It was a moving picture with a running commentary.

"Additionally regular farm ads have appeared in weekly papers and in *The Utah Farmer* and in these a reverse spot states that 97% of the farms in UP&L territory have electricity available. During the Aug. 19 week special ads, 50 in number, featured the fact that electricty is now available to nearly all U. S. farms, and calling attention to the week. In dailies and weeklies the week of Aug. 26 another ad was used. The farm electrification story was worked into numerous speeches and was featured in publicity releases. Farm sections of two Sunday newspapers, the *Tribune* and *Deseret News*, featured farm electrification, Aug. 26, using pictures and story from the company's history. Releases and pictures to the country weeklies were also sent out. In other words, we are telling the farm electrification, saturation and availability story wherever and whenever we can find a vehicle."—*M. L. Cummings, advertising and sales promotion director.*

Washington Water Power Co.

"We have felt that the state land grant colleges have never received the credit they should have had for their work in farm electrification. The National Rural Electrification Week offers an opportunity to tell that story. In our area the heads of the agricul-

tural engineering department from the land grant colleges in Idaho and Washington are going with us to tour the towns and cities and tell meetings, sponsored by the chambers of commerce, about college research and projects started as far back as 1925 to develop uses of equipment for the farm in order to make it possible for the farmer to pay the costs of electricity. The results of their efforts have made it possible for private power companies to build lines and it also made it possible for the REA to put its shoulder to the wheel and speed up the rural line program.

"We feel that actually Rural Electrification Week is a tribute to our colleges who made everything possible for rural electrification. Of course the funds for the work were contributed by the private companies. In 1925 there were only 30 uses for electricity in industry and today there are over 500 uses for it on the farm.

"In addition, ads were run in the newspapers in farm areas, showing farms in the region. For instance the one that received electricity first; a farm in the most inaccessible area; one using the most equipment; one with the largest family. Testimonials from these families told the part electricity played on their farms. Window displays in dealer stores congratulated the company and the REA for a grand job.—*A. E. Meyer, agricultural development manager.*

Other Western utilities, like Idaho Power Co., Portland General Electric Co., Montana Power Co., Public Service Co. of Colorado, not heard from in this roundup of what was being done in celebration of the Week, have long records of farm electrification promotion.

C&I Training *is* Important

So Utah P&L refreshes its sales staff on it

Commercial and industrial electric selling probably needs more knowledge than any other class of electric business. Companies whose sales forces do not keep up with new applications, opportunities and competitive fuels fall behind in this important phase of over-all commercial operation.

It is no accident that Utah Power & Light and Washington Water Power Co. were among the top six companies in amount of new commercial load added in 1950 per eating place. Sales Manager W. A. Huckins of Utah Power & Light Co. believes in training, continuously. A recent four-day training conference in Salt Lake City has prepared the staff of that company's head office and division sales personnel to sell the idea and method intelligently. The dealers sell the equipment itself.

In setting up the program for the conference, Huckins drew upon both outside and staff people. The first day's program devoted to commercial cooking and baking was under J. H. Shaw, UP&L commercial sales director, who arranged and planned the entire program. Speakers for that session included Joseph Steenblik, Restaurant & Store Equipment Co.; G. E. Dangler, commercial district manager for Hotpoint Inc., San Francisco; and Chuck Alft, sales promotion engineer, Hotpoint, Chicago.

Steenblik told how cooperation between company and dealer would mean more and better sales. Dangler discussed the market in that area. Alft first outlined features and advantages of heavy-duty ranges, later bake ovens, counter cooking equipment and advantages of in-plant feeding, using electric equipment.

Staff members E. N. Christofferson, Darcie White and Clyde Waterman showed slides of local installations. Then Evelyn Hansen, home service director, by means of a sample lunch on a tray, pointed out not only the equipment needed to cook a school lunch but also that not required. Slides were shown of local installations by L. S. Evans, Marden Millward, Clyde Waterman and L. G. Lofgren of UP&L.

Lighting occupied the next two days, and the coverage extended from sources, through store, window, service station, theater, office, flood, sports, industrial, school and street lighting. G. B. Buck, district engineer, G-E Lamp Department, Denver; Robert Thunen, district engineer, Sylvania Electric Products Co., San Francisco; Harold Speirs, Graybar Electric, Salt Lake City; C. J. Vacher, G-E Supply Corp.; G. A. Finlayson, architectural engineer, Utah Oil Refining Co.; P. W. Smith, Westinghouse Electric Corp., Salt Lake City, and Charles R. Long, Los Angeles; B. E. Brazier, architect, were drawn upon from the outside. UP&L salesmen Clark Newell, Wayne L. Shaw, A. J. Powell, Wayne F. Mulcock, H. Dale Phillips, R. M. Pizza, Darcie White, Marden Millward, A. N. Vendell. Allen G. Rudy, Alton P. Rose, L. S. Evans and E. L. Holt participated in discussions and showed slides of installations.

Vacher and Finlayson brought out design features by means of an interview type of presentation. Architect Brazier told of how power company salesmen and architect can best cooperate. The designing and selling of each kind of lighting was presented by the outsiders, then typical installations shown and described by the utility men.

Refrigeration, air conditioning, infrared and germicidal was treated in the same way one afternoon session, bringing in C. R. Henderson, commercial sales manager, W. H. Bintz Co., to speak on refrigeration requirements for modern food stores; George Sabol, Refrigeration Distributors Corp., on air conditioning. Buck told of infrared and germicidal lamp applications. Local installations were shown by staff salesmen.

Last day's session opened with consideration of the utility's place in the industrial development of its territory, which J. C. Littlefield, Salt Lake division manager, presented. D. R. Jenkins, Westinghouse, told of advantages in using capacitors. H. N. Raymond, G-E, presented the company's *More Power To America* program by means of sound slide film.

E. M. Naughton, assistant general manager, UP&L, informed all of the utility's power capacity expansion program. Walter Hendron, rate engineer, lead open discussion of rates, rules and regulations. R. H. Ashworth, vice-president and commercial manager, outlined company growth in this field and summarized the need for continued training. Huckins closed the meeting with an admonition to salesmen to make use of the knowledge gained.

Midget heating applications had also been described by Keith Bates, G-E. Clarence J. Hardy, welding specialist, Salt Lake Hardware Co., discussed opportunities with welding and showed a movie of proper techniques.

Stimulated by the informative talk, often illustrated either with equipment or pictures, from outside experts, the group engaged in lively discussion, which in itself served to fix the knowledge gained.

McMillan McDonald

Porter Carpenter

Enns Ewell

Portland AIEE Sets Attendance Record

All registration records for a Pacific general meeting of the American Institute of Electrical Engineers were broken by the Portland Section in staging the 1951 annual meeting at the Multnomah Hotel in Portland, Aug. 20-24. Final registration figure was 887, exceeding by nine the previous record set by the San Francisco Section in 1949. The technical program under the chairmanship of Waldo Enns also was outstanding with a number of high-caliber timely papers. A total of 88 papers was presented in the four days of parallel morning and afternoon meetings. Careful arrangement of paper grouping held conflict of interest between sessions to a minimum. A reception on one evening for President McMillan and a banquet on another were combined with a number of well-patronized inspection trips to round out a most successful meeting.

Institute President F. O. McMillan of Oregon State College traced the history of engineering from its beginning in France in the 15th century down to the present. He said that we are facing a serious situation in our secondary schools in that students are not being adequately prepared for college. All were urged to look into the basic preparation being given in high schools. Of those asking for admission to OSC last year, 57% did not have the necessary mathematics for admission, he said. Engineering education was related to our productivity to show that engineering education has played an important part. He said that our superiority in production is from wider availability of higher education at low cost.

Brig. Gen. O. E. Walsh, Corps of Engineers, said that the Columbia River system is unique in that it is the only section of the U. S. where power development and flood control are compatible. Multipurpose development of the Columbia with Canadian cooperation is the only way to attain maximum resource development, he said. The fact that 90-95% of the cost of multipurpose developments is justifiably chargeable to power, he feels, will bring about the rapid construction of projects listed in the Army Engineers 308 report.

Series Compensation

Series compensation of high-voltage transmission lines to increase their economical loading was one of the livest topics of discussion at the meeting. Valuable contributions to this subject were made by E. C. Starr, Oregon State College, and Alexander Dovjikov, Bonneville Administration; R. E. Marbury and F. D. Johnson, Westinghouse; E. L. Harder, J. E. Barkle, R. W. Ferguson, Westinghouse; R. J. Hopkins, T. R. Walters and M. E. Scoville, G-E Co.; G. Jancke and K. F. Akerstrom, Swedish State Power Board; Bror O. N. Hanssen and A. B. Liljeholmens, Kabelfabrik, Stockholm; R. S. Seymour, BPA, and E. C. Starr, OSC; and C. C. Diemond, E. J. Harrington and J. R. Curtin, BPA.

It was brought out in the various papers and discussions that it is now technically and economically entirely feasible to use static capacitors to increase the economic loading of medium length and long transmission lines. Some of the papers were of a general nature covering the economies of series compensation of various high-voltage conductor sizes and length. Other papers were devoted to a discussion of the BPA initial series capacitor installation at Chehalis substation in the 230-kv transmission circuit between the Seattle and Portland areas. This installation is the first one at high voltage in the U. S. and the first anywhere with provision for reinsertion of the capacitator bank within one-half cycle after the isolation of a system fault which has caused the capacitor protective equipment to isolate the capacitors. In this 24,000-kv installation the bank is protected against overvoltage by unique air-blast protective gaps. These are set to flash over at 2½ times normal rated voltage. Purpose of the air-blast feature is to provide high-speed reinsertion of the capacitors after the removal of the condition which gave rise to overvoltage. This feature is indispensible in the application of series capacitors for improvement of power system transient stability.

The installation has verified the analytical conclusion that there are no insurmountable problems in the application of series capacitors to transmission lines. Hence, a whole new approach has been made to the problem of very long distance transmission in the order of 250-500 miles. With this form of compensation economy of long distance transmission can be improved from 25-40%.

The Bonneville Power Administration is interested in the loading of its backbone transmission lines to a degree not heretofore generally practiced in the interest of obtaining transmission economy. To accomplish this degree of loading and to maintain it throughout the network, BPA has found series compensation the most economical solution.

Two series capacitor installations with 130,000 kva of capacity are presently under construction. Exten-

Barkle Starr

Sidway Seely

Cone Edwards

sive use of synchronous condensers and shunt capacitors, both low- and high-voltage, will continue, of course, to constitute an important part of the whole reactive control program.

Switchgear

Five papers comprised one session devoted to switchgear. A. C. Schwager, Schwager-Wood Corp., described a pole - mounted load interrupter switch being widely used by utilities to fill the gap between fuses and conventional oil circuit breakers. The interrupter switch has been made for voltages only up to 115 kv so far, but in answer to a question Schwager said the switch could be developed for voltages of 230 kv if desired. F. B. Johnson and R. E. Friedrich, Westinghouse, gave a paper describing the design of a new oil-poor 230-kv breaker of 7,500,000 kva interrupting capacity. The breaker is a logical step, they said, in the trend toward achieving a minimum oil content but still retaining the advantages of the time-proved, dead-tank construction. The new 230-kv breaker is built around a novel watchcase design of tank with reduced oil content and where simplified methods of oil handling and maintenance procedures are possible. A. C. Conger, USBR, reported that tests at Grand Coulee switchyard confirmed the belief that bus resistors could be used that would reduce the asymmetrical fault current on breakers. However, it was found that the characteristics of the copper alloy conductor would prevent its usage in this instance in that the conductor temperature would be prohibitive under heavy load conditions and the presently installed 10,000,000-kva circuit breakers are considered adequate for the Grand Coulee plant.

A 15-kv, 1,000-mva, 1,200-amp compressed air breaker which has been giving satisfactory service in switching large capacitor banks was described by B. P. Baker, Westinghouse. It consists essentially of an indoor compressed air circuit breaker with its air supply system housed in a weatherproof metal enclosure. The air inlet to the operating mechanism was enlarged to increase the opening speed of contacts from about 12 to 16 ft per second. Another shock absorber was added to decelerate the contacts to minimize shock for highly repetitive service. A. E. Brock, Pacific Electric Mfg. Corp., stressed the adequacy of mechanical design in oil circuit breakers because this factor has the greatest influence on cost, maintenance, reliability and ease of conversion for future requirements. He described the many features of his company's RHE tank-type circuit breaker built in ratings up to 10,000,000 kva in the 230-kv class. Six series breakers per pole provide total open-gap contact separation at a rate of more than 18 in. per cycle. Six interrupters per pole provide short arcing times on light currents without resort to resistors or pumps and provide interrupting margin for heavy faults and out-of-phase switching. A new version of a mechanically trip-fill compressed-spring operating mechanism is employed.

Large Power Transformers

An informal proposal of new values of transformer insulation tests, which it is hoped will lead toward changes in the AIEE and ASA standards tests to permit the construction of more economical transformers, was made by G. W. Clothier, Allis-Chalmers. He suggested the following tests: (1) A full-wave test to demonstrate the impulse strength. This value can be the same as the present Basic Impulse Level since BIL values have proved satisfactory in service. (2) A low-frequency test about 25% above the *system* fault levels. This test could be made at any suitable low frequency between 60 and 500 cycles. (3) A test of long duration at 25% above operating voltage to demonstrate the long-time ability of the transformer to withstand operating voltage. It is believed that the 7,200-cycle induced test does not adequately demonstrate this, since it is possible to build a transformer that will satisfactorily pass impulse and induced voltage tests, and yet fail in operation. Since this test is of long duration and may be of several thousand hours, it would not be a practical test on every unit made, but would be a required general design test.

Clothier believes that tests of this kind would result in transformers having adequate strength for lightning arrester protected circuits, and would also provide considerable economies in construction. In addition, they would permit construction of smaller, lighter, and hence, more powerful transformers, and further economies can result from their use. He said that large power transformers could be reduced 10% in cost by meeting operating levels as proposed instead of using present test levels. P. L. Bellaschi, BPA consultant, and H. L. Rorden, BPA, agreed that Clothier's thinking to break away from old standards is progressive and along the right lines.

Some of the many varied engineering aspects of the transformer noise problem were traced by Armand V. Lambert, Portland General Electric Co. Present noise level standards should be revised for power transformers to be installed in urban substations, he said. Present means that could be used to attenuate noise were given as: use of special steel with little magnetostriction, reduction of flux density to retain advantages of low magnetostriction steel, careful design of core and coils to avoid resonance and vibration, insulating the core from the tank by padding to avoid transmission of vibration to tank

Brock Conger

Rustebakke Dovjikov

Brown Clothier

walls, use of acoustical impedances or noise barriers in the oil, design tank to avoid resonance, mount fittings on resilient cushions, build sound barriers or enclosure around the transformer, and provide adequate distance between the transformer and the nearest building.

Methods of obtaining correct line drop compensation on single-phase voltage regulators on 3-phase systems were outlined by H. L. Prescott, Westinghouse. He listed these as use of auxiliary current transformers, phase shifting networks and modified compensator settings. All three methods are in satisfactory use.

Performance of a mobile oil refinery used by his company was given in a conference paper by Delmar L. Brown, Portland General Electric Co. Recent advent of oxidation inhibitors and availability of small portable units for clay filtering and vacuum dehydration can now provide reclaimed oil equivalent to new oil in nearly all respects. Cost for materials and power runs nearly 21c per gallon. This reflects present high material and labor costs as well as the costs involved in washing down the transformer core, and limited drying with hot oil.

Conductor Vibration

One entire session was given over to the important topic of conductor vibration. Robert H. Nau, University of Illinois, opened the symposium with his paper, "Analysis of Conductor Vibration." He described aeolian vibrations that are produced by very steady winds blowing across suspended transmission conductors. It was explained how Stockridge dampers and armor rods function as impedance matching devices rather than energy absorbers, by use of the electrical anolog. Consideration was also given to ice forming on lines, and how gusty winds can cause galloping or dancing

Osiporich Rorden Bellaschi

conductors. He recommended that overhead grounding wires be stressed only to 15% of ultimate at 60 F, as compared to the present code of 25%. Also, conductors of high-voltage lines should be sagged to carry a tension not to exceed 20% of ultimate at 60 F.

New methods of analyzing conductor vibration field data currently being used were described by R. F. Steidel Jr., Oregon State College, and M. B. Elton, BPA. The first phase, that of determining the allowable stress for indefinite life on all conductors, is being studied in the vibration laboratory at Washington State College. As soon as present comparative tests of absorbers, armor rods, suspension clamps, etc., are completed, fatigue tests are planned in the laboratory using the various types of conductors and overhead ground wire used on the BPA system. The second phase of the problem is being studied to incorporate an improved type of vibration recorder, now nearing completion at OSC, which will measure simultaneously the amplitude and frequency of field vibration. The instrument called a "cluster" counter consists of three or four cycle counters, each of which registers all of the vibration occurring above a different amplitude. A "severity" curve, described in the paper, can be found directly by simply reading the instruments. By mixing the outputs of two to four variable-frequency oscillators and driving an oscillograph with the resulting signal, Bernard Fried and A. R. Hard, WSC, have been able to reproduce practically all types of conductor vibration patterns observed in field records. The system is being used as an aid to the analysis of field recordings, making it possible quickly to separate the amplitude of each frequency present in a given record.

A fourth paper by Bernard Fried and M. A. Gudor, WSC, dealt with the damped and undamped vibration characteristics of type H-H copper conductor.

Communication—Electronics

Communication and electronics occupied all or part of several sessions. Comment on only a few of many timely papers can be here presented. To the long list of transcontinental pathways of communication there is now added a microwave radio-relay system, making possible many hundreds of new telephone circuits as well as transmission of several television programs, D. T. Cone, Pacific Telephone & Telegraph Co., told the group. He referred to the recently completed radio-relay link between Omaha and San Francisco. The Western Electric TD-2 microwave system employed provides broad-band channels similar to those provided by coaxial cable facilities.

Microwave radio equipment will provide a major part of the long-distance communication facilities of the Bonneville Power Administration, said A. W. Adams. BPA now has 205 miles of microwave and plans ultimately an additional 400 miles that will link all major substations, plants and district offices.

Results of tests made of telemetering equipment submitted by four manufacturers in order to make com-

Hayes Carlberg

M. G. Lewis Naughton

Laurel Lewis Backer

parisons and evaluations of their operating characteristics, was reported by John I. Holbeck, BPA. In no case did over-all error of any of the systems exceed 1% at normal voltage and frequency. The author feels that the art of telemetering has been advanced as a result of the elaborate tests involving special equipment.

Principles of an electronic telemetering system that has high-speed response and flexibility of application was described by Carl Oman, Westinghouse. Thermal wattmeters, usually referred to as thermal converters, were selected as the power measuring instruments mainly because they are suitable for forward and reverse power, lend themselves readily to totalization, and have no moving parts.

Many other papers on carrier, microwave, telemetering, instruments, measurements and related subjects were given. No copies were available.

Space Heating

Proponents of electric space heating received encouragement from a paper presented by L. E. O'Brien and C. R. Lester, BPA. This paper gave detailed cost analysis of the Benton County PUD distribution system and indicated that for present and future electric space heating loads this Public Utility District can serve the load successfully and improve its over-all load characteristics. Supplementing a field trip inspection, J. Donald Kroeker discussed the operating characteristics and performance of the heat pump installation in the large Equitable building in downtown Portland. W. R. Volheye, chief electrical inspector, State of Oregon Bureau of Labor, summarized the problems of safely installing electric heating systems. He emphasized that prohibition by some utilities had indirectly resulted in an abnormal amount of unsafe wiring where users put in electric heat anyway. To offset this he urged publication of a guide similar to that prepared by TVA's development section.

Industrial Papers

Three sessions were devoted to industrial power applications. Corrosion of mechanical and current-carrying electrical apparatus works havoc in varying degrees in many industries, said H. E. Springer, Rayonier Co., Port Angeles, Wash. He recommended study of atmospheric conditions before installing or replacing electrical equipment, selection of right protective metals and dielectrics, protective painting and plating, and air conditioning when equipment is installed indoors.

Electric "motocylinders," devices making possible new and effective methods for powering log and lumber handling machinery, have been installed in a number of Pacific Coast mills, the group was informed by H. A. Rose, Westinghouse. The device is essentially a generator with a short powerful crank on its output shaft. The crank is connected to the device to receive reciprocating motion by a connecting rod. Uses are log hauls, reel case unloaders, log kickers, lift skids, cutoff saws, log carriage loaders, and many other applications.

W. D. Vincent and Fred Thompson, G-E, described an amplidyne-controlled veneer lathe drive recently introduced to the plywood industry by their company. Other papers dealt with electric log-carriage drives and motor applications in the pulp and paper industry; conversion of facilities at Geneva Steel Co. to peacetime operations; mine conveyor systems. variable-speed pumping units; and experience with grounded and ungrounded 480-v delta systems. On the latter, C. B. Wagner, G-E Co., said that experience with both in a large Western industrial plant had led to the conclusion that it was better to operate 480-v delta power distribution systems ungrounded.

In an electrochemical session, J. W. Harper and Waldo Porter, Alcoa, had papers dealing with development of the aluminum industry and power supply to that industry. Electrical installations in an aluminum plant were covered by G. B. Scheer, Kaiser Engineers Inc. Two other papers dealt with cathodic protection.

Power

Two sessions on power included papers on modern automatic hydro stations; the Northwest Power Pool; the Tracy pumping plant; rotating amplifiers for control of bus voltage fluctuations; grounding effectiveness at Grand Coulee switchyard; electrical features of Pacific Gas and Electric Co.'s Contra Costa steam plant; the Gadsby steam plant of the Utah Power & Light Co.; operation of steam auxiliaries at subnormal speeds; and kilowatts and atomic energy. In the latter, H. A. Carlbert, G-E Co., described the electrical distribution system at the Hanford atomic works where the criteria for electrical service had been 100% continuity of power supply, no voltage fluctuation, absolutely constant frequency, no process shutdowns for equipment failure, and no process shutdowns for system maintenance. Carlberg said engineers had met these requirements, although unheard of, with a remarkable degree of success.

Space limitations prevent even the listing by title of many other fine papers presented at the four-day meeting. Sufficient coverage, however, has been given to indicate that the technical program was packed with meaty papers and that the convention as a whole was a credit to the Portland Section under the able general chairmanship of Charles E. Carpenter, Pacific Telephone & Telegraph Co.

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Northwest Association Elects New Officers

A. S. Cummins, president, California Oregon Power Co., Medford, Ore., was elected president of the Northwest Electric Light & Power Assn. at the 44th Annual Meeting in Portland, July 31. Cummins succeeds Thomas W. Delzell, chairman of the board of Portland General Electric Co., who held the position last year.

Other officers elected at the meeting were: first vice-president, R. E. Gale, assistant to the president, Idaho Power Co., Boise, and second vice-president, John Dierdorff, vice-president, Pacific Power & Light Co., Portland.

Members of the board of directors representing manufacturers, distributors, contractors and dealers were elected as follows: Don Rennewanz, Hotpoint Inc., Seattle; U. E. Sandelin, Allis-Chalmers Mfg. Co., Portland; Ralph H. Sroufe, Westinghouse Electric Supply Co., Portland; Myron Swendsen, Utility Equipment & Supplies, Boise; Howard Hume, Hume and Rumble, Vancouver, B. C.; Gordon Smith, Electric Smith Inc., Spokane; George Rankin, Yakima Hardware Co., Yakima, and O. E. Bigelow, Beers-Bigelow Co., Salt Lake City.

The board of directors for the current year will be completed by the appointment of representatives from each member utility company and the subsequent election of five members-at-large, and by the appointment of the treasurer and four section chairmen.

Twelve industry pioneers of the Pacific Northwest, who have rendered long and distinguished service to the industry and the association were

Cummins Delzell

elected to honorary life membership. They were as follows: Geo. L. Myers, assistant secretary and assistant treasurer of Pacific Power & Light Co.; J. E. Yates, engineering department of that company, now retired; J. C. Henkle, general superintendent, and John S. Volpe, superintendent of underground, Portland General Electric Co.; Z. E. Merrill, chairman of the board, Mountain States Power Co.; S. P. Hogan, formerly secretary, Montana Power Co., now retired; Magnus T. Crawford, chief engineer, Joe Hellenthal, engineer, and George Sears, superintendent of power supply for Puget Sound Power & Light Co.; Homer C. Bender of the business development department, Washington Water Power Co., now retired; R. G. Chamberlain, formerly vice-president Hurley Machine Co., Seattle, now retired; Tom C. Clarke, Northern Electric Co., Montreal, formerly of B. C.

The association commenced electing honorary members in 1919 and now has 62, a veritable "who's who" of persons who have influenced the growth and development of the industry in the association's territory. Twelve others, formerly holding this honor, have died in the past 12 years.

NFPA

National Fire Protection Assn. plans to have a regional meeting in Portland, Oct. 24-25. It will be one of several regional meetings held throughout the country by NFPA to cover the various aspects of that organization's activities among which are sponsorship of the National Electrical Code. Fire Marshall Miles Woodworth of Portland, is chairman of local arrangements and Ray Larrabee, Underwriters' Laboratories, Seattle, a member of the committee.

NISA

Tom Ford, Boulevard Electric Co., San Diego, was recently elected president of a newly formed San Diego Chapter of National Industrial Service Assn. G. M. Daniels of Vista was elected vice-president and John H. Lough, Meridian Electric Service, El Cajon, secretary-treasurer. Meetings are held in various towns in San Diego County . . . W. E. Boyd, Pacific Electric Motor Co., Oakland, was appointed on the Chamber of Commerce of the U. S. committee of NISA and on the public affairs committee. W. E. Hogue, chairman, Los Angeles Chapter, is on several committees and is a director of NISA.

PANORAMA OF THE PCEA

Edited by A. X. Schilling

Changes Made in Program, Meetings

Some radical changes from custom are being made this year in the PCEA meeting and convention program and even more may be in store next year after a committee to study the subject makes its recommendations. The board of directors at its meeting in San Francisco Aug. 16 instructed President Sherwin to appoint a committee to develop a program and agenda for operating in the future. It then authorized the guidance committees of the three sections to use their own judgment as to whether to hold a fall conference or not.

It rather definitely decided that there would be conferences of the sections in the spring before the convention, to wind up the work that in the past has been attempted in parallel sessions at the convention. The convention itself probably will be on a more modest scale and will have only general sessions.

The Administrative Service Section has decided on two joint meetings with similar groups in the gas association. One half of the section's committees will meet in San Francisco at the Whitcomb, Nov. 1-2. The other half will meet in the spring. There are two joint committees with the gas association, one to study the NARUC proposed standardization of accounts; the other to study a program for destruction of old records and to include the feasibility of microfilming records. Ed Wright, San Diego Gas & Electric Co., will be chairman of the latter.

Both the Operating Economics and the Business Development Sections have decided to hold no section conference this fall. The Operating Economics Section will meet in Fresno at Hotel Californian April 10-11, 1952, the Business Development Section April 24-25, 1952, somewhere in the Los Angeles area. Meanwhile the several committees of each section will arrange their own individual meetings to set up the year's program and to carry it on until the section conference in the spring.

Dates for the PCEA annual convention itself have been set for May 21-23, at a place as yet not decided.

The following members have been appointed to serve as members of the guidance committees during the present term:

Administrative Services Section—Dexter Stoner, Coast Counties Gas & Electric Co., Santa Cruz, chairman; H. L. Moore, Southern California Edison Co., Los Angeles, vice-chairman; J. T. McNab, Central Arizona Light & Power Co., Phoenix, sponsor of the discussion group on "Development of Unit Cost and Manpower Standards"; K. A. Reeder, Southern California Edison Co., Los Angeles, sponsor of the discussion group on "Building Design and Maintenance"; J. O. Jones, PG and E, San Francisco, sponsor of the discussion group on "Priorities and Material Controls"; C. N. Rudkin, Southern California Edison Co., Los Angeles, sponsor of the discussion group on "Tabulating Equipment Utilization."

Business Development Section—H. C. Rice, Southern California Edison Co., Los Angeles, chairman; V. C. Redman, PG and E, Fresno, vice-chairman; S. H. Winter, General Electric Co., San Francisco, sponsor of the agricultural load building group; H. J. Scaife, Hotpoint Inc., San Francisco, sponsor of the kitchen and laundry group; J. A. Corlett, General Electric Co., San Francisco, sponsor of the industrial and commercial power and lighting group; L. D. Dame, Southern California Edison Co., Los Angeles, co-sponsor of the above group.

M. J. Sherwood, National Electrical Contractors Assn., San Francisco, sponsor of the sub-group on industrial and commercial wiring; C. R. Long, Westinghouse Electric Corp., Los Angeles, sponsor of the sub-group on industrial and commercial lighting; J. H. Gumz, PG and E, San Francisco, sponsor of the subgroup on industrial and commercial power.

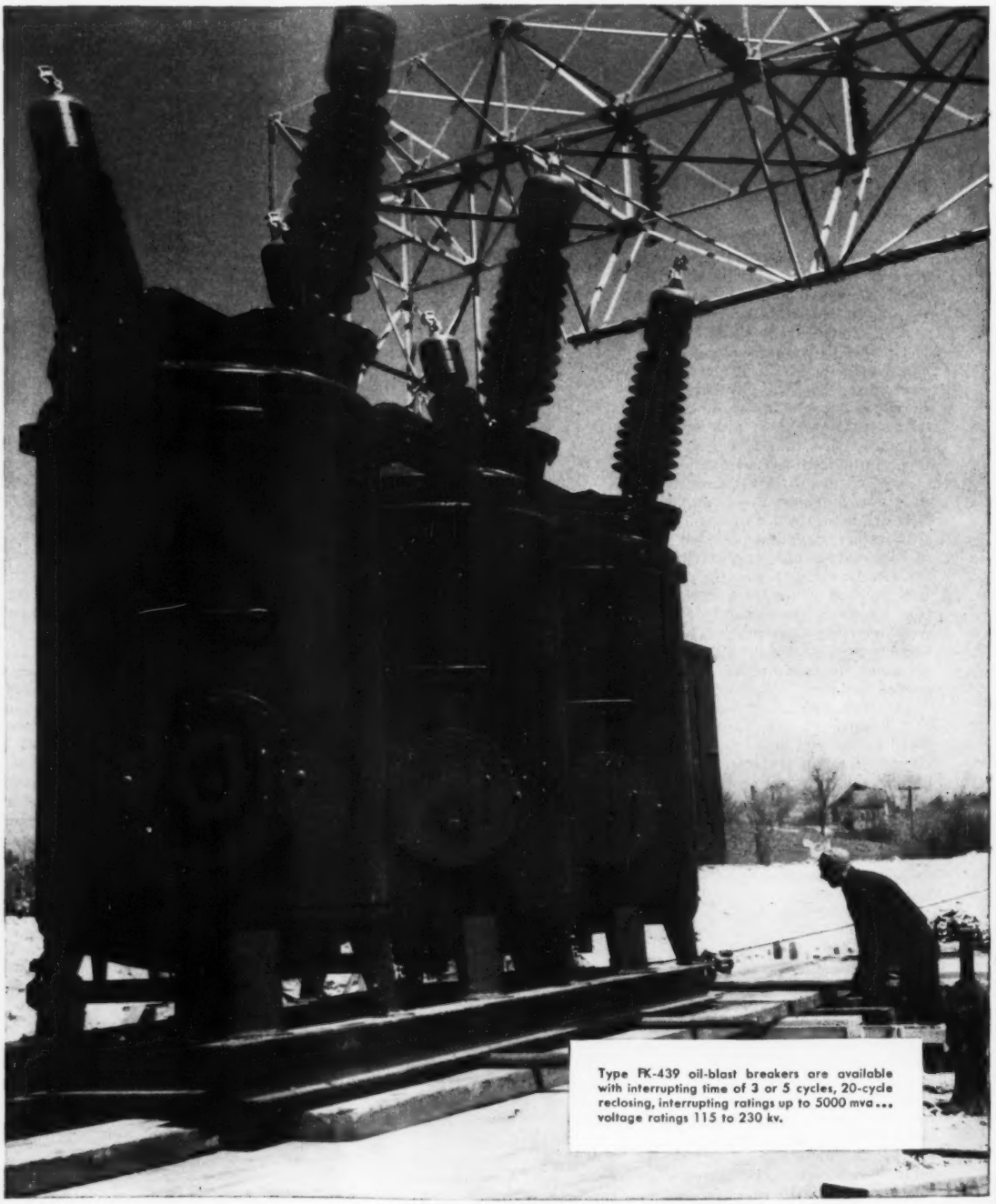
E. M. Tallon, Southern California Edison Co., Santa Ana, chairman of the home lighting committee; E. G. Stahl, PG and E, San Francisco, chairman of the 4-H Club electricity project committee; E. W. Meise, San Diego Gas & Electric Co., chairman of the residential adequate wiring committee; H. H. Robison, PG and E, Oakland, chairman of the school lighting committee; Dale MacKenzie, General Electric Co., San Francisco, chairman of the liquified petroleum gas committee; J. C. Chamberlain, Bureau of Home Appliances of San Diego County, San Diego, chairman of the television committee; Pauline Eliker, Southern California Edison Co., Los Angeles, chairman of the home economics committee; F. E. Bodine, Westinghouse Electric Corp. San Francisco, member-at-large.

Operating Economics Section—Alf Hansen, General Electric Co., San Francisco, chairman; P. H. Adams, San Diego Gas & Electric Co., vice-chairman; C. N. Parker, California Electric Power Co., Riverside, sponsor of the underground transmission and distribution group; G. E. Bishop, Coast Counties Gas & Electric Co., Santa Cruz, sponsor of the communications group; W. A. Howe, Westinghouse Electric Corp., San Francisco, sponsor of the overhead transmission and distribution group; P. L. Savage, General Electric Co., Los Angeles, sponsor of the substation group; M. A. Fredrickson, Southern California Edison Co., Alhambra, sponsor of the meter group; C. L. Hathaway, San Diego Gas & Electric Co., sponsor of the steam generation group; F. I. Lawson, PG and E, San Francisco, sponsor of the hydrogeneration group; F. S. Benson, PG and E, San Francisco, sponsor of the engineering design group.

Roy McCann, Southern California Edison Co., Los Angeles, chairman of the safety committee.

The following are members-at-large of the Operating Economics Section guidance committee: V. D. Armstrong, Sierra Pacific Power Co., Reno; T. A. Phillips, Central Arizona Light & Power Co., Phoenix; R. D. Spear, Foster-Wheeler Corp., San Francisco; J. N. Landis, Bechtel Corp., San Francisco; J. A. Longley, Allis-Chalmers, San Francisco.

Central Hudson Gas and Electric



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adds 33,000 kva of capacity

Type FK-439 oil-blast breakers protect new 110-kv system

Recently Central Hudson Gas and Electric Corporation embarked on an expansion program to add 33,000 kva of capacity to its Catskill substation. Since plans called for changing high-line voltage from 66-kv to 110-kv, new circuit breaker equipment was necessary.

Company officials chose G-E Type FK-439 oil-blast breakers to protect the new installation. Multi-break interrupters and a dependable pneumatic operating mechanism provide high-speed performance and operating economy. Completely sealed bushings and accessibility of all internal parts simplify inspection and maintenance. Breakers were shipped with "unit base" mounting, which cut down installation time and expense.

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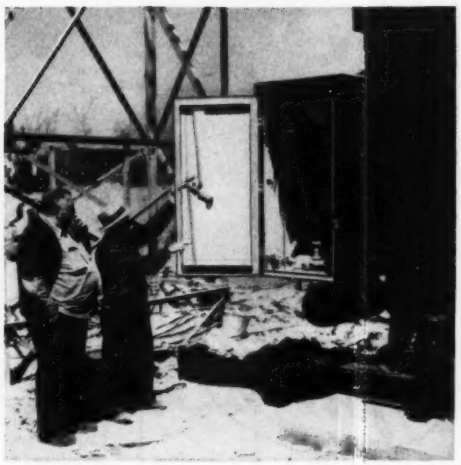

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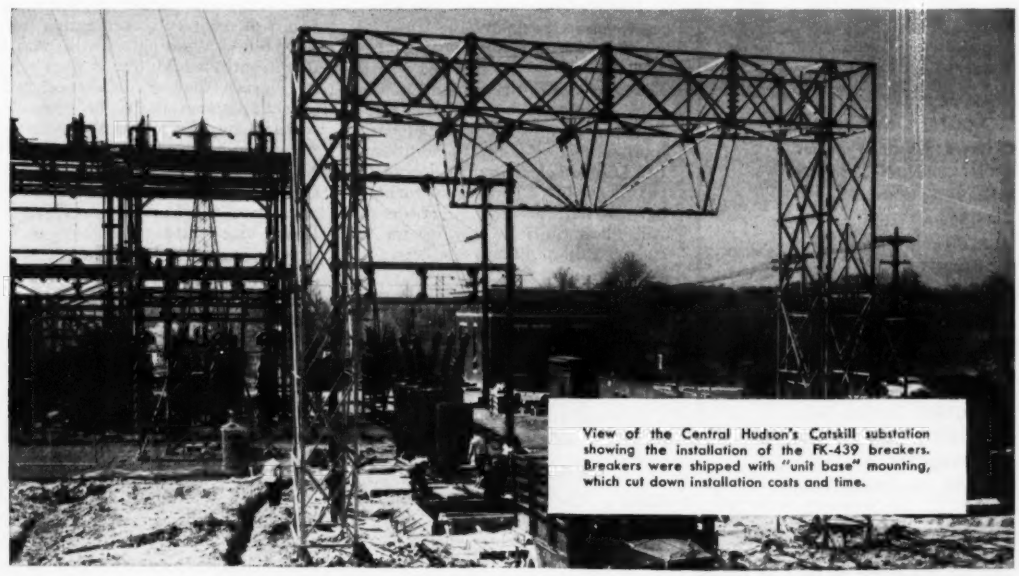

View of the Central Hudson's Catskill substation showing the installation of the FK-439 breakers. Breakers were shipped with "unit base" mounting, which cut down installation costs and time.

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Hawaiian Conference

The second annual Hawaiian conference of PCEA has been scheduled for the Royal Hawaiian Hotel, Honolulu, on Nov. 29 and 30. Leslie A. Hicks, PCEA vice-president for the Hawaiian area, has been working on a program for several months and promises an event well worth attending. Among those who have indicated intention to attend are: J. H. Pengilly, vice-president of Square-D Co., Los Angeles; R. W. Turnbull, commercial vice-president of General Electric Co., San Francisco; J. H. Polhemus, president of Portland General Electric Co.; Walter C. Heston, engineering editor, ELECTRICAL WEST.

Other mainliners who may attend include: E. D. Sherwin, PCEA president, and vice-president of the San Diego Gas & Electric Co.; Ashton B. Collins, New York City, originator of the Reddy Kilowatt figure; George W. Whitwell, vice-president of the Philadelphia Electric Co.; George B. Gadsby, president of the Utah Power & Light Co., Salt Lake City, and president of the Edison Electric Institute.

Electrical Living

The home economics committee is repeating its successful Electrical Living Institute program. The two-hour sessions will be conducted in the Southern California Edison Co. Electrical Living Center in Pomona each Tuesday evening during October, a total of five sessions. In addition to the Los Angeles County School Department, the school departments of San Bernardino and Riverside also will allow institute credits for the course. Pauline Eliker, Southern California Edison Co., chairman of the home economics committee, has announced that Marjorie Helm, California Electric Power Co., will be chairman of this year's Electrical Living Institute.

In recognition of his many years of service, the PCEA board of directors recently voted an honorary membership to Harry L. Harper, Graybar Electric Co., Los Angeles, who resigned from the board because of ill health. Sam W. Scott, who succeeded Harper as Pacific District manager of Graybar, was appointed to serve the unexpired term on the board.

Copies of The Back-Patter, which recorded the highlights of the recent convention in Los Angeles, have been mailed to all members. The *Back-Patter* was prepared and published by the advertising and publicity committee, under the chairmanship of F. L. Raymond, San Diego Gas & Electric Co. Its 28 pages were devoted to photographs and summaries of the events during the convention, plus reproductions of a few photos taken at previous gatherings.

RMEL

Some idea of the program at the annual meeting of the Rocky Mountain Electrical League at La Fonda Hotel, Santa Fe, N. M., Sept. 9-12, was given by Ralph Hubbard, manager, on a recent visit to San Francisco. The meeting itself will be reported in full in the October issue.

Tentative program included a welcome from Governor Mechem of New Mexico; an address by George M. Gadsby, president, Edison Electric Institute and Utah Power & Light Co.; a response by John E. Loiseau, president and general manager, Public Service Co. of Colorado; and it is hoped that Dr. John W. Cline, president, American Medical Assn., will discuss that group's campaign to save medicine from socialization. Robert R. Gros, PG and E director of public relations and advertising, San Francisco, will address the first joint luncheon. John S. Skillman, director of technical coordination division, NPA, Washington, will discuss the "Controlled Materials Plan"; M. M. Boring, manager, technical personnel division, G-E Co., Schenectady, will talk on "Technical Manpower—Present and Future Outlook"; W. D. Kyle Jr., president, Line Material Co., Milwaukee, "What We Can Expect from the Manufacturer"; S. J. Rosch, vice-president in charge of research, Anaconda Wire & Cable Co., "Trends and New Developments"; A. W. Peterson, Hotpoint Inc., Chicago, "From Tombstones to Touchstones"; David Davis, national sales manager of TV, General Electric Co., "Trends in Television"; Sam G. Hibben, president, Illuminating Engineering Society, and director applied lighting, Westinghouse Lamp Division, Bloomfield, will give a lighting demonstration of new things; Professor Sherman Smith, University of New Mexico, "Atomic Energy" (with a possible visit to the Los Alamos project); Edwin Vennard, vice-president, Middle West Service Co., Chicago, "What the Future Holds."

Major event last month of the Rocky Mountain Electrical League in cooperation with the National Electrical Contractors Assn., Rocky Mountain Chapter, was the annual industry picnic at Elitch's Gardens, Aug. 3.

IEA

Annual conference of the Intermountain Electrical Assn. is set for Sept. 21 at the Newhouse Hotel, Salt Lake City. Details of the program have not yet been announced by W. A. Huckins, sales manager, Utah Power & Light Co., who is general chairman for the conference. R. S. Belknap, General Electric Co., is chairman of the banquet committee, and John Longdon, Westinghouse Electric Supply Co., of the ladies' entertainment; J. F. McAllister, Utah Power & Light Co., tour committee; Ray Halvorsen, manager of the IEA, and Lon Richard, attendance and publicity. The program will be confined to one snappy day of short and pertinent talks aimed primarily at helping the industry to handle the situations of the present day. Full report on the meeting will be made in a later issue.

The annual meeting of the IEA was held Aug. 17 at Lagoon. It was a family affair for all people in the electrical industry in the region. E. E. Pritchett was chairman of the attendance committee and Carlos Stone, former IEA manager, was chairman of the general committee.

The Utah County Chapter of the IEA had an electrical show, Aug. 2 and 3, at Provo under the direction of Charles E. Larsen of the Provo City sales department.

NCEB

A first all-industry dinner meeting in some time was held in Fresno under the auspices of the Northern California Electrical Bureau and Pacific Gas and Electric Co. in mid-July to review the selling situation and to coordinate the industry, and revive activities of the bureau in that area. H. H. "Kelly" Courtright, division manager, PG and E, presided. Speakers were Ray Turnbull, G-E vice-president; Charles Matthews, Westinghouse Electric Supply Co., San Francisco; Rod Doerr, PG and E vice-president; and Jack Ross, merchandise manager. Speaking for the retailers was William Turpin, a pioneer dealer; and Frank Caglia, newly elected president of the NECA Chapter in Fresno, for the contractors.

● **John S. Dempsey Jr.,** engineer for the Puget Sound Power & Light Co., has been elected chairman of the Tacoma, Wash., subsection of the American Institute of Electrical Engineers. **Harold A. Brenner,** sales engineer for General Electric Co., is the new vice-chairman, with **Everett E. Martin** of Tacoma as secretary-treasurer.

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NECA

Oregon-Columbia Chapter—A service to its members and to other NECA members, representing a tremendous amount of research and work, has just been completed by the Oregon-Columbia Chapter, NECA, and its manager, Laurence C. Rodgers. It is an Electrical Contractors Guide and two accompanying maps in great detail. The guide, mimeographed, gives a list by cities in Oregon, Washington and Alaska, of the electrical contractors license and permit fees, regulations, union jurisdiction and wage rates, and the name of the inspector or public official to whom to apply. A second map was prepared for the Northwest Line Constructors Chapter. The wage rates listed are as of July 1, 1951. The chapter has a file of the building regulations and labor agreements for its members' information.

Another service established by this growing chapter is that of a bid depository for the electrical contracting industry in the chapter territory. It was scheduled to go into effect in September. The plan includes reporting, and listing all jobs of over $1,000 to assure uniform information for estimating and then filing with a designated bank of duplicate copies of bids 12 hours prior to the bid opening time, except on government jobs, which have public openings.

Northwest Line Constructors Chapter, NECA, agreed to a wage increase for all classifications of line workers of IBEW locals 77, 125, 483 and 659, effective July 23. The journeyman lineman rate went to $2.75 per hour. Rates range from $1.80 for hole digger to $3.41 for cable splicer foreman. Jobs bid prior to Jan. 1, 1951, were to be finished at former rates.

Rocky Mountain Chapter, NECA, was preparing to elect new officers and getting ready for attendance in force to the national convention in Washington, D. C., Oct. 8-12. It was also offering alternate plans for meeting programs to its sections in Denver, Laramie, Cheyenne, Casper, Colorado Springs and Pueblo. The Denver section voted for seminar meetings under supervision of a discussion leader.

Northern California Chapter, NECA, is endeavoring to keep its members informed of regulations that affect the business nowadays and what the remaining opportunities are. On Aug. 2, a meeting of both its branches was held to get the latest information regarding the CMP from Walter Davis and Merrill Woodruff of NPA. Scheduled for September are two meetings to probe into the possibilities of survival of the home building business. The southern Alameda county group will meet at International Kitchen, Sept. 20, to hear John I. Hennessy, executive vice-president of Associated Home Builders of the East Bay. The entire chapter will meet at Hotel Leamington, Sept. 27, and will have representatives of architects and builders present to discuss the building situation. Ed Buttner, who has recently returned from a flying trip around the world, with attendance at the Electrical Contractors Assn. of England convention in May, will show color pictures he took on his trip and tell of the convention. Buttner has been nominated by this chapter for re-election as labor relations committeeman for District 6. The July issue of the English magazine, *The Electrical Contractor and Retailer,* printed his address in full and had numerous pictures of him and Mrs. Buttner at the convention. The board of directors of the chapter met July 26, delegated its representation to the NECA convention and took no action on President William Goulart's request to resign, thus retaining him until the end of the year. Efforts are being continued to promote a uniform electrical code for the entire East Bay area.

Montana Chapter, NECA, plans to submit to the state legislature again a state electrical licensing law. Its president, Bob Rowe, has made a trip to California, visiting various chapters of NECA en route and return.

W. P. Robbins, Salt Lake City, was elected president of the Utah-Idaho Chapter, NECA, for another term at the recent annual election of officers. Others named were: Lynn A. Thomson, vice-president; R. E. Bartlett, treasurer; and the following as directors: L. A. Herdti, E. R. Forsberg, Robert B. Swaner, C. I. Berrell, C. L. Murphy, R. W Bauchman, Idaho Falls, and A. R. Woolley, Pocatello. C. A. Howarth is Utah-Idaho Chapter manager.

C. D. Casey, owner and head of Casey Electric Co., Seattle, has been named president of the Puget Sound Chapter, NECA. Larry Gattavara, O. A. Carlson Electric Co., vice-president of the Seattle division; William D. Whinery Jr., Tide Co., Tacoma, vice-president of the Tacoma division; Howard Chase, Chase Electric & Machinery Co., vice-president of the Northern division. Don W. Close, is chapter governor. Charles Meagher, Mars Electric Co., is treasurer. Directors elected were: Seattle division—Grover Burke, C. D. Casey, Frank Holert, Charles Meagher, Ralph B. Lane, Larry Gattavara; Tacoma division—William D. Whinery Jr., James D. Irwin; Northern division—Howard E. Chase, Ben A. Ven Deusen. John B. Majerus, chapter manager, also announced the following committee heads: apprenticeship—Frank Holert; Northwest Conference—C. D. Casey, president, Don Close, governor, and John Majerus, manager, are official representatives; construction council—John Sroufe; code committee—Charles Meagher; labor negotiation—Van S. McKenny; labor-management—Van S. McKenny; legislation—R. B. Lane; statistics-educational—Walter Anderson; membership—Charles Meagher.

EMEA

Lincoln F. Meaney of Macy's was recently elected president of the Electrical Maintenance Engineers of Northern California, and Lawrence E. Saville, vice-president. Roy Henning is secretary.

Ed V. Muller, engineer and inspector, California Division of Industrial Safety and president, Southwestern Section, IAEI, explained the new Electrical Safety Orders revision to the EMEA of Southern California at its July meeting. The attendance was 153, despite vacations. Muller was kept answering questions late into the night. The EMEA made a tour of the industries of the Long Beach, Wilmington and San Pedro area the easy way, on board an excursion boat, Aug. 15. Its September meeting was scheduled to be a field trip to the Hyperion plant.

NAED

Reservations are being made by R. A. Balzari, secretary, Pacific Zone National Association of Electrical Distributors for its annual convention at Ahwahnee Hotel, Yosemite Park, Oct. 1-3. Program for the general meetings is in the hands of a committee, according to E. A. Phillips, chairman . . . National headquarters of NAED has moved to Norway House, 290 Madison Ave., New York City, it was announced by Charles G. Pyle, executive director.

Electric Clubs

D. R. Barnsley, Canadian General Electric Co., Vancouver, succeeds J. H. Taylor, B. C. Electric Co., as president of Vancouver Electric Club. Frank Crosby, Northern Electric, is vice-president; J. Don, Electric Panel Mfg. Co., secretary; and H. J. Ashbee, Amalgamated Electric, treasurer.

Utility Executives Endorse Hotpoint's Plan of Action During a Guns and Butter Economy

Geared to the problem of Load-Building and Load-Balancing, Hotpoint's timely program, prepared in chart form, is ready for presentation to utility management.

Operating under a dual economy has presented problems to many businesses, including utilities, which call for a re-appraisal of what we've been doing and a new look at what needs to be done now. In the light of present complex conditions, Hotpoint has prepared a suggested long-range utility promotion program timed for introduction during the period of Defense Mobilization. Those utility executives who have reviewed this program, and the supporting material available for your use, have praised the sound planning that has gone into it. We shall be happy to present it to your organization.

UTILITY DIVISION
Hotpoint Inc.
(A General Electric Affiliate)
5600 West Taylor Street, Chicago 44, Illinois

SCS SUBSTATION DESIGN

Simplifies Testing and Inspection!

POTENTIAL TRANSFORMERS AND CONTROL POWER TRANSFORMERS ARE ACCESSIBLE . . . DRAWOUT MOUNTED IN ALLIS-CHALMERS SCS SINGLE CIRCUIT UNIT SUBSTATIONS

AUXILIARY TRANSFORMERS are switchgear components. That's why they are drawout mounted in safe, metal enclosed compartments of the switchgear! They are easy to get at in SCS Single Circuit Unit Substations . . . not fixed mounted or sealed into the oil filled power transformer tank.

When specifying a single circuit unit substation for your distribution system, why accept less than the accessibility, safety and low cost maintenance possible with this arrangement?

This is how Allis-Chalmers drawout mounted potential and control power transformers simplify testing and inspection . . . cut maintenance costs . . . help give better customer service:

1. Potential transformers and control power transformers are physically separated from the power transformer. This isolation is an added assurance of service continuity.

2. Easy accessibility permits use of fuses in both primary and secondary circuits for more complete equipment protection.

3. Use of standard design makes replacement easy.

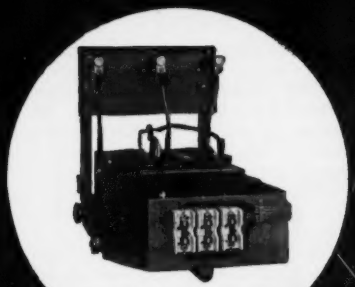
4. Personnel protection. Drawout mounted auxiliary transformers are "dead" when in position for inspection, testing or maintenance.

Allis-Chalmers SCS Single Circuit Unit Substations are modern appearing — can be fitted quickly into your distribution system.

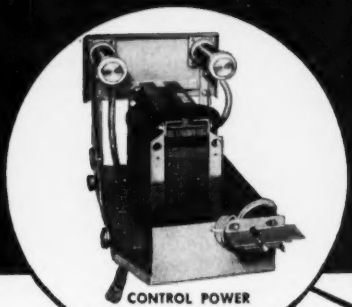
A-3268

Pioneers in Load Ratio Control
Originators of 5/8% Step Regulators

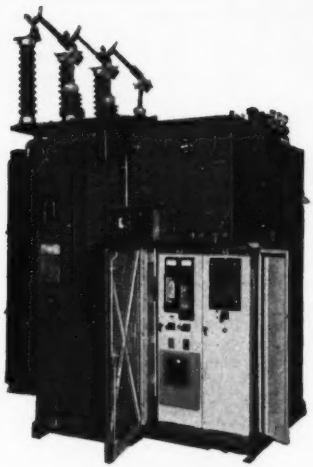
ALLIS-



POTENTIAL TRANSFORMER



CONTROL POWER TRANSFORMER



What does this arrangement of Auxiliary Transformers mean to You?

1. *Easier Maintenance* because auxiliary transformers are located in the switchgear . . . not in the power transformer tank.

2. *Simplified Testing and Inspection* because the PT's and CPT's are very accessible on drawout mountings.

3. *Greater Safety* because they are disconnected from the line *automatically* when accessible for maintenance.

For more information, call your A-C Sales Office or write Allis-Chalmers, Milwaukee 1, Wisconsin for bulletin 11B7457.

CHALMERS

A-C ALLIS-CHALMERS

IES

September will see the beginning again of meetings of the Illuminating Engineering Society throughout the West. In each case new officers will be taking over the reins for a year of activity. They are:

British Columbia Section — H. J. Ashbee, Amalgamated Electric Corp., Vancouver, chairman; R. W. Racine, British Columbia Electric Co., Vancouver, secretary; board of managers: D. S. Gordon, A. A. Jones, W. J. Lind, F. S. Pettet, E. W. Thompson.

Northern California Section—Stanton M. Blacksmith, PG and E, Oakland, chairman; Robert W. Thunen, Sylvania Electric Products, Emeryville, vice-chairman; Beth McCrone, C. A. Von Bergen, San Francisco, secretary-treasurer; board of managers: James E. Barnes, Sol Cohn, Dan M. Finch, William R. Major.

Oregon Section — Ellsworth R. Fletcher, Portland General Electric Co., chairman; R. W. Preston, Oswego, vice-chairman; Frank M. Reis, Pacific Power & Light, Portland, secretary-treasurer; board of managers: J. G. Galarneau, William M. Graham, F. C. Henkel, Philo D. Smith.

Puget Sound Section — Byron G. Lind, City Light Department, Seattle, chairman; Freeman C. Scharr, Seattle, vice-chairman; G. D. King, Puget Sound Power & Light Co., Seattle, secretary-treasurer; board of managers: George Cooley, Frederick E. Cooper, H. A. Gardner, C. A. Scheyer.

Rocky Mountain Section — G. B. Buck II, Public Service Co. of Colorado, Denver, chairman; Ferman Bischofberger, Public Service Co. of Colorado, Denver, vice-chairman; Arthur F. Weers, Weers Electrical Planning Service, Denver, secretary-treasurer; board of managers: Richard L. Haney, R. N. Hankins, William B. Petch, Carl Strain.

Southern California Section—S. H. Simonsen, Westinghouse Electric Supply Co., Los Angeles, chairman; W. L. Friend, Sylvania Electric Products, Los Angeles, secretary; board of managers: L. D. Black Jr., R. H. Kreyser, W. A. McGuire, D. W. Prideaux, W. B. Smith.

Inland Empire Chapter, Spokane—Dave Parker, Columbia Electric Mfg. Co., chairman; William Newman, Washington Water Power Co., vice-chairman; George Morrison, Washington Water Power, secretary-treasurer; board of managers: Fred White, Robert Wilkinson, Blair Ploughman.

Utah Chapter — Wayne L. Shaw, Utah Power & Light Co., chairman; Clark B. Newell, Utah Power & Light Co., secretary-treasurer; board of directors: Marvin E. Dansie, Leonard M. Slusser, Harold K. Speirs.

National officers in the West are L. A. Hobbs, Smoot-Holman Co., Inglewood, Calif., a member of the board of directors, and the regional vice-presidents are Ken Hollingsworth, Puget Sound Power & Light Co., Seattle, Northwestern region, and Carl Martin, Benjamin Electric & Mfg. Co., San Francisco, vice-president, Southwestern region.

Last meeting of the **Southern California Section,** IES, was made outstanding by hearing the prize winners of the Student AIA-IES contest discuss their entries on the basis of "How I Did It and Why." The section sponsored the architectural student lighting contest and awarded six prizes. The first $100 in cash, the second $25, third $10, and the fourth, fifth and sixth Honorable Mention prizes were one year's student member subscriptions to IES. There were 70 entries for this fourth year architectural class of the University of Southern California. The project was handled by Dean Gallion of the School of Architecture, USC, together with members of the IES section.

Oregon Section, IES, is planning this fall a group of study club meetings in outside cities in Oregon beginning with Eugene. A road-show-type of study club program will be taken to meetings of contractors, fixture people, electricians and utilities.

IAEI

While final plans for both the annual meetings of the Southwestern and Northwestern Sections of International Association of Electrical Inspectors to be held at Long Beach and Spokane respectively are still not completed so far as outside speakers are concerned, it is pretty well determined that the major interest will be in discussing the National Electrical Code and any proposed changes to be made for the next edition. The 1951 code has been out long enough for field experience. The procedure for the next change to the code has been definitely set up with a deadline for new material as January 1952 for any new proposals. The programs so far have allowed plenty of time for code discussion.

The **Southwestern Section** meeting at Lafayette Hotel, Long Beach, Sept. 13-15, will begin the series of annual meetings of the sections. Ed V. Muller, division of industrial safety, section president, will preside and Arthur Veit, Los Angeles County chief electrical inspector, president, will make his first presidential address.

Among the speakers programmed so far are G. E. Manning, superintendent of label service, Underwriters' Laboratories Inc., Chicago; R. W. Stange, assistant general manager, National Board of Fire Underwriters, San Francisco, who will speak on "The Value of the Electrical Inspector"; F. E. Hodgdon, chief engineer, American Gas Assn., Cleveland; and V. G. Mulligan, merchandising manager, Ideal Industries, Sycamore, Ill. Ben H. Wheater, Long Beach chief electrical inspector, is chairman of the local annual meeting committee.

Some of the same speakers will address the Northwestern Section and additional speakers from that region may be included. Charles L. Smith, secretary-treasurer, IAEI, Chicago, will attend and address both meetings.

Oregon Chapter of IAEI tried to solve the meaning of Article 500 relating to hazardous locations in a lively meeting June 15, over which Chairman James Vernon presided, in Portland. New officers were also elected. The new chairman is Reed Connell; vice-chairman, Cliff Atkins; Paul L. Miller remains secretary-treasurer; and to the executive committee James Backenstos and Lee Adams were named. In the discussion over Article 500 L. W. Going, Portland chief electrical inspector and member of the correlating committee of NFPA on the code, spoke and endeavored to answer questions put by various inspectors as to interpretations of meanings. At its previous meeting Jack Stumph gave an informative talk on aluminum conductors, comparing them with copper, and describing methods for making connections and for soldering.

Northern California Chapter, meeting at Hayward, Calif., July 14, passed two significant motions. The first was to refer the article in the National Electrical Code relative to use of fixtures as raceways back to the article committee for clarification and rewording. Another motion was passed condemning the action of certain city attorneys in ruling that school buildings were not to come under the jurisdiction of electrical inspection in the cities in which they are built. Harold Gerber, consulting engineer, continued explanation of changes in the new edition of the National Electrical Code and is to do the same at the next meeting, Nov. 17, in San Jose after the Southwestern Section annual meeting. A proposal for revision of the service entrance clearance rules over low-roof houses, coming from the Public Utilities Commission, was debated but no action taken.

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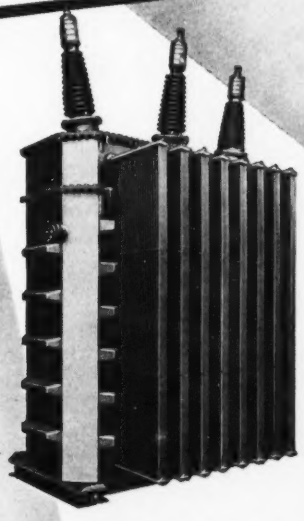
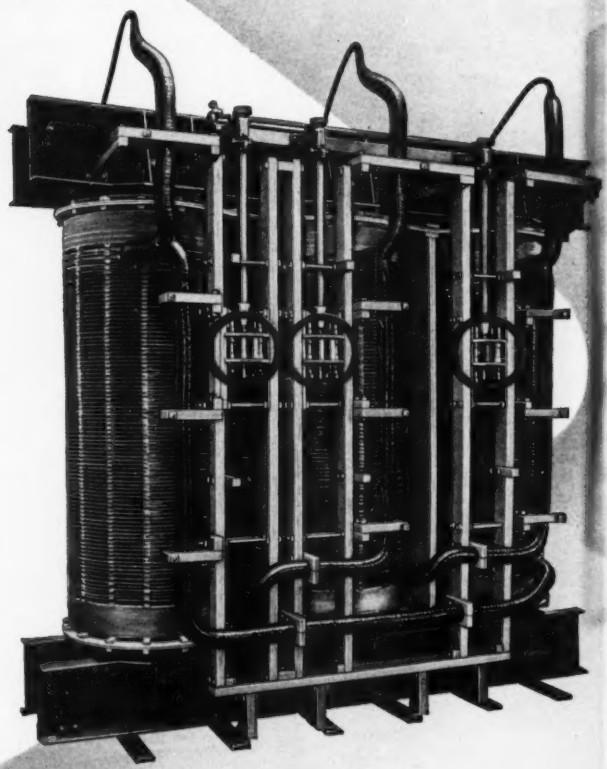
. . . the choice of leaders in industry

WAGNER POWER TRANSFORMERS

QUALITY . . . ALL THE WAY THROUGH

Wagner Power Transformers have a reputation for quality —inside and out—established through sixty years of service to the power industry and proved by service records from the field, dating back to the early 1900's. They are liberally designed and are built with painstaking care to enable them to give years of uninterrupted service. Use of highest quality materials and rigid inspection and tests have made Wagner Power Transformers "the choice of leaders in industry."





Wagner Power Transformer Elements are particularly outstanding because of their inherent strength and stability and because of their compact design and careful construction. They have sufficient capacity to not only carry their normal load but to be able to handle an overload when the emergency arises. That's why Wagner Transformers have established records for continuous service and long life in all types of industrial plants and transmission lines.

Bulletin TU-181 tells the complete story . . . you should have a copy. Consult the nearest Wagner branch for advice on your next transformer installation.

Snap acting rotary type tap changers, designed to permit changing the voltage ratio quickly and effectively, are located near the taps and are connected for gang operation from a single operating handle outside the tank.

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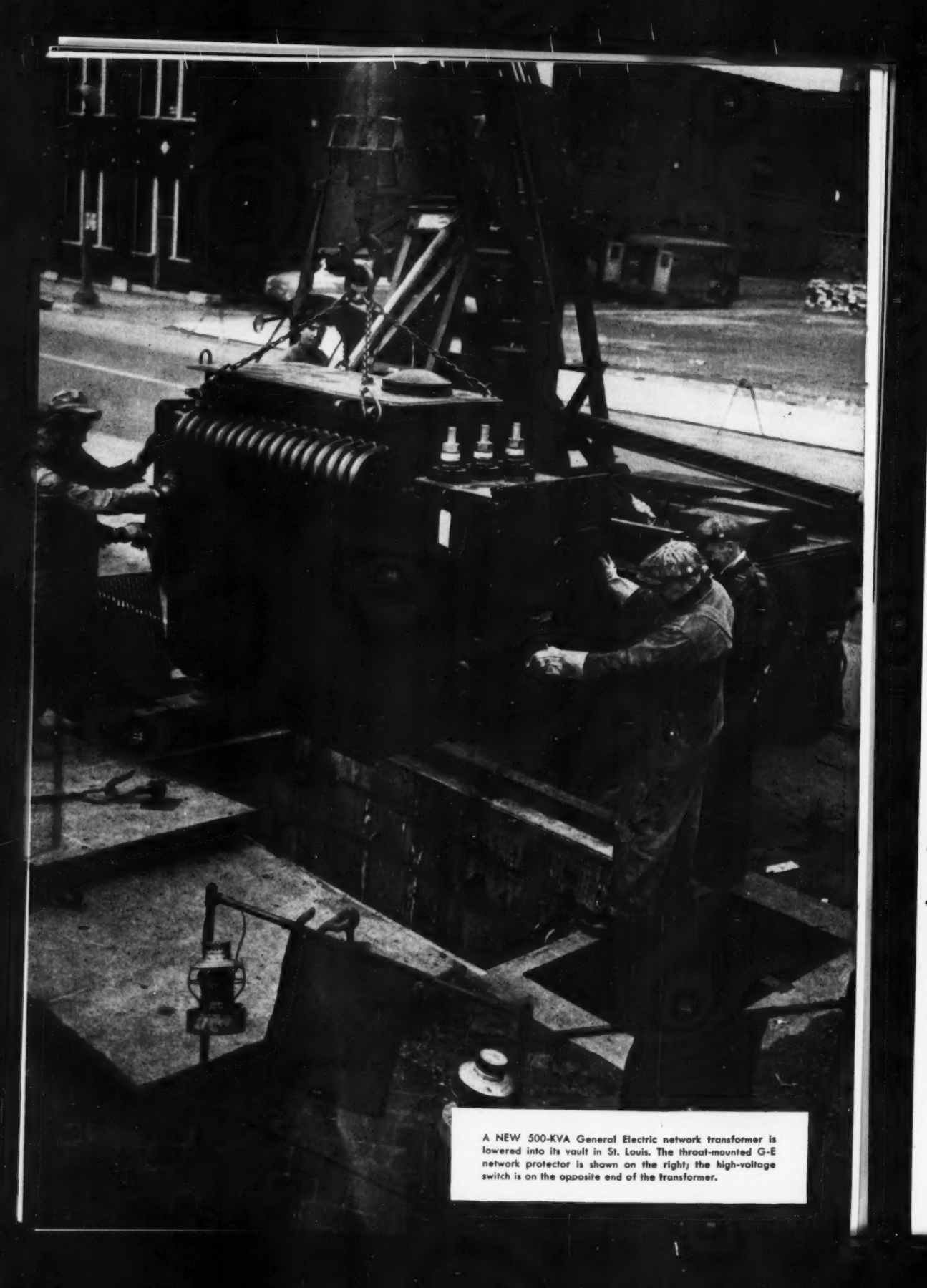
AUTOMOTIVE BRAKE SYSTEMS - AIR AND HYDRAULIC

BRANCHES IN 31 PRINCIPAL CITIES

TU-6



A NEW 500-KVA General Electric network transformer is lowered into its vault in St. Louis. The throat-mounted G-E network protector is shown on the right; the high-voltage switch is on the opposite end of the transformer.

More Capacity for St. Louis' Network System

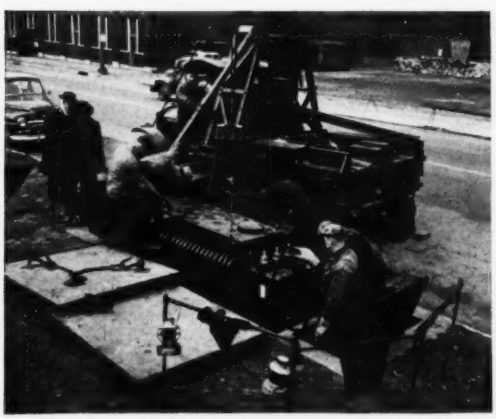
Installation of this G-E Network Unit demonstrates once more how a network eliminates headaches connected with load growth

It's an old story to users of networks, but still mighty impressive—the ease with which you can meet increased loads, once you have gone to a network system.

The place is St. Louis. The utility, the Union Electric Company. Load in the area around Clark Avenue and 15th Street had grown to the point where an additional transformer was needed.

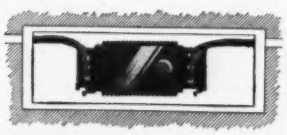
With a network, this addition was easy! A vault was constructed. A high-voltage feeder extended two blocks, from Market and 14th. The secondary cable brought into the vault. Then, with everything ready, and at the convenience of the construction crew, a new 500-kva transformer was installed—and connected during the daytime, with no interruption of service. With a total of three different high-voltage feeders serving the area, the one involved in this installation was killed while the new network unit was being connected. When all was set, the feeder was re-energized and the new transformer picked up its share of the network load.

With a network, service connections as well as low voltage grid connections are provided initially thus eliminating any need for rearrangement or reinforcement when a new transformer is added. In every respect, each added transformer represents an orderly step in system growth that was all automatically provided for when the network was first installed. *General Electric Company, Schenectady 5, New York*

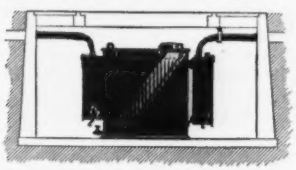


ALMOST IN PLACE! By using standard G-E network units, Union Electric Co. has kept vault construction costs to a minimum. Complete servicing of the transformer, switch, and protector can be done from the two ends—so that the vault can be made narrow enough to fit between sidewalk and curb.

Narrow, shallow vaults when you use G-E Standardized Network Equipment



With manhole openings at both ends, vault need be only 14' long, 4½' wide for a 500-kva transformer.



A vault depth of 7' below roof slab will provide sufficient room for maintenance and inspection.

GENERAL ELECTRIC

402-109

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

THE MONTH IN BRIEF

Early Decision Probable in WWP Case

Possibility that an unidentified interest may buy the Idaho properties of Washington Water Power and clear the way for sale of the Washington properties to a group of Washington PUDs was disclosed at a 15-hour SEC hearing in Washington, D. C., Aug. 24. At the hearing, called to expedite dissolution of American Power & Light, its president, Howard Aller, asked for more time (until Jan. 1) to dispose of its last major electric utility holding. Aller went to the meeting with a resolution from his board of directors to "be receptive" to terms equal to or better than the $56-61 million offered by Washington PUDs last February in a deal balked by court decision that Washington public bodies could not own and operate properties in Idaho. He said a third interest would buy the Idaho properties and operate them under contract with the Washington PUDs. Faced by a court fight unless he can satisfy SEC that he is not deliberately delaying American's dissolution, Aller threatened counter action if not allowed time to make a deal with the PUDs. Richard Jones, Electric Bond & Share attorney, called for immediate distribution of WWP stock among American stockholders at the rate of 1 1/10 shares for each American share held. Objections that the properties could not be economically operated if divided along state lines were entered by attorneys for the city and county of Spokane, Governor Jordan of Idaho and others. An early SEC decision was expected.

Five-Year Contracts Proposed by BPA

Power contracts eliminating the yearly termination clause have been proposed by Bonneville Power Administration to five Oregon and Washington power companies. Five-year contracts that may be renegotiated at the end of the second year and are renewable for three-year periods would be substituted. The proposed contract continues to give preference to public agencies and contains federal rate control provisions. The companies are not guaranteed any firm power until needs of preference customers have been met and public agencies may continue to contract with new industrial customers. Bonneville, however, would not take new industrial customers for its own account until power company requirements had been fulfilled. Present contracts expire Sept. 30. The proposed agreement was announced following conferences between Bonneville and the five companies—Mountain States Power, Pacific Power & Light, Portland General Electric, Puget Sound Power & Light, Washington Water Power. Copies of the proposed contract were sent to public power agencies and opposition of the Oregon State Grange has been reported in the press.

Drastic Power Cut Faces Northwest

Serious unemployment in Pacific Northwest industries is better than a 50-50 chance this fall and winter because of poor water conditions on that region's hydro plants. Critical water would bring about a deficiency of 600,000 kw or more in the 4,900,000-kw Northwest Power Pool, according to a paper presented before the American Chemical Society in New York, Sept. 4, by Walter C. Heston, ELECTRICAL WEST, and Edwin Fleischmann, consulting engineer. Even with average water there will be a shortage of 300,000 kw, they predict. Plans for orderly curtailment are being made by DEPA and Northwest power representatives.

Steam Plant Dedicated

Contra Costa, PG and E's new 300,000-kw steam plant near San Francisco, was officially dedicated Aug. 26, when Lieutenant Governor Goodwin J. Knight synchronized a 10,000-kw house turbine with the three 100,000-kw units in the plant and the PG and E system. Four hundred newspaper men and Bay Area civic leaders were guests of the company for the ceremony. Barely completed, the plant is already being extended to house two more 100,000-kw units.

First Unit Installed at Gadsby Plant

First 66.000-kw unit of Utah Power & Light Co.'s $21,860,000 Gadsby plant near Salt Lake City underwent initial tests recently. The second generator, a 75,000-kw machine, will go on the line in October 1952. The station is designed to accommodate an eventual third unit, which will bring over-all capacity to more than 230,000 kw.

Los Angeles Starts Valley Steam Plant

Ground-breaking ceremonies for the Los Angeles Department of Water & Power's Valley steam plant were to be held Sept. 6. The plant is being designed for an ultimate maximum capacity of 512,000 kw, sufficient to supply the electrical needs of a city with one million population. Estimated cost is $69 million.

FPC Legal Staff Recommends Pelton License

Members of the Federal Power Commission legal staff have recommended that a federal license be granted for construction of Pelton Dam on the Deschutes River in Oregon, despite strong opposition by fishing interests. Portland General Electric Co.'s petition for a license is before FPC Examiner William J. Costello. Costello turned down Tacoma's Cowlitz River project, which also had received legal staff recommendation.

Slide Creek Plant in Operation

California Oregon Power Co. has placed in operation its new Slide Creek power plant on the North Umpqua River in southwestern Oregon. The plant is the second of eight scheduled for construction by the company on the North Umpqua. It has a generating capacity of 17,000 kw.

PUD Condemnation Suit Dropped

Chelan County (Wash.) PUD has abandoned its condemnation suit against Pacific Power & Light Co.'s Merwin development on the Lewis River. The suit, filed in May 1950, was dismissed in U. S. District Court at Tacoma after the PUD failed to follow up its initial court filing.

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BIG 4
★ Easy to Fish Through
★ Smooth-bending
★ Easy to Cut and Thread
★ Underwriters' Laboratories and National Electrical Code approved . . .
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Spang-Central's Big 4 Conduit family. . . "Cenlaco". . . "Central Black". . . "Central White". . . and "Central EMT". . . provide you with a complete choice of conduit to fit any requirements. Dependable Spang-Central Conduit is sold through prominent recognized distributors.
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Electrical Wall Insert, Wall Surface Attachable and Portable Space Heaters with AUTOMATIC THERMOSTAT or MANUAL CONTROL
A Guide to Quick Heating

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How to Select the Right HEETAIRE for Every Purpose

Here's the first and only complete GUIDE to the selection of electrical wall-insert and wall-attachable space heaters!

It gives all the information about QUICK HEATING you've always wanted — types, sizes, heating principles, thermostatic heat controls, recommended wattages — plus an exclusive chart based on the four factors that determine the selection of the correct HEETAIRES.

It's yours for the asking — just drop us a card.

Chooose the Right HEETAIRE for Every Purpose!

Look at this Table of Contents

The Principles of HEETAIRES Types and Sizes

- ★ THERMOSTATIC CONTROLLED Operation
- ★ Series 230 HEETAIRES . . . Fan-Forced Radiant Heat 1250 to 3000 Watts
- ★ Series 250 HEETAIRES . . . Fan-Forced Black Heat 1500 to 3000 Watts
- ★ Series 210 HEETAIRES . . . Fan-Forced Black Heat 3000 to 5000 Watts
- ★ Series 200 HEETAIRES . . . Radiant Heat 1000 to 2000 Watts
- ★ Series 240 HEETAIRES . . . Radiant Heat 1000 to 1500 Watts

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THIS MONTH'S NEWS

Northwest Power Report Released to Public

A report on the Pacific Northwest power situation made in February to Interior Secretary Oscar L. Chapman was released to the public last month. The report was from G. Girard Davidson, who had been assigned to the survey as special consultant to the Interior department.

The report proposes a program of power development to be superimposed on the "normal power development program" for the area. It lists two phases: (1) an immediate phase that could be made effective almost immediately or within 30 months, and (2) a second phase, including starts on federal power projects designed to accelerate the program after four years.

Projects in each phase fall into two groups: (1) projects involving no known controversy, or only limited controversy or objection that is considered surmountable; (2) those involving controversy or objections of a serious or difficult nature.

Immediate phase projects falling under the first classification are steam plants at Coos Bay, Ore., and Bremerton and Longview, Wash.; Pacific Power & Light Co.'s Yale project on the Lewis River in southwestern Washington, and expansion of Rock Island Dam on the Columbia River. Immediate phase projects coming under the second classification include the city of Tacoma's Cowlitz River project, recently receiving adverse ruling from the federal power commission examiner, and the Pelton Dam on the Deschutes River in Oregon, a project sponsored by Portland General Electric Co. In this category also was listed the proposed Oregon-California intertie.

Second phase projects listed as involving no serious controversies were The Dalles Dam, a Corps of Engineers project on the Columbia, and Hells Canyon Dam on the Snake River. Both of these dams have been approved by Congress, but no appropriations have been made for their construction.

Listed as strongly opposed by fishing interests is Ice Harbor Dam on the Snake River a short distance above its confluence with the Columbia.

BPA MAY HAVE TO DROP INTERRUPTIBLE LOADS

Nine major electrolytic industries in the Pacific Northwest have been notified by Bonneville Power Administration that interruptible loads totaling 314,000 kw will have to be dropped during the coming winter months unless unusually good water conditions prevail on the Columbia River. Included in the industries receiving this warning are all aluminum plants in the northwest area.

Bonneville Administrator Paul J. Raver explained that these loads would have to be dropped to protect the rest of the region against cutbacks. He described prospects of better than normal flows on the Columbia as "fairly remote." The warning, he said, was being issued in order to enable industries concerned to make arrangements for steam or imports of other power to continue operations should interruptible hydro become unavailable.

Cutoff date for interruptible power from federal projects would be about Oct. 1 if normal flow prevails, with resumption of service about Feb. 1 or, if critical flow prevails, as late as April. Between these dates all federal generation would be required to meet firm power agreements.

Interruptible loads to be dropped under normal river flow conditions are: Aluminum Co. of America, Vancouver, Wash., plant, 42,200 kw; Kaiser Aluminum and Chemical Corp., Spokane and Tacoma plants, 118,900 kw; Reynolds Metals Co., Longview, Wash., and Troutdale, Ore., plants, 36,300 kw; Victor Chemical Works, Silver Bow, Mont., 25,000 kw; General Service Administration, Spokane magnesium plant, 47,000 kw; Keokuk Electro-Metals Co., Wenatchee, Wash., 21,900 kw; The Carborundum Co., Vancouver, Wash., 1,200 kw; Pennsylvania Salt Mfg. Co., Portland, 10,400 kw; Union Carbide and Carbon Corp., Portland, 8,500 kw, and Pacific Carbide and Alloys Co., Portland, 2,600 kw.

Records show that winter flows of the Columbia have been unusually good in only four years of the last 21. Flows were in the normal range 12 years and were poor to critical in five years.

● **General Electric Co.** pay roll at the Hanford Works near Richland, Wash. topped 8,800 Aug. 1, and is expected to exceed 9,000 by the end of this year. The pay roll now is at the highest point since General Electric began operation of the plant.

APPROVED FOR R.E.A. USE

No. 1261

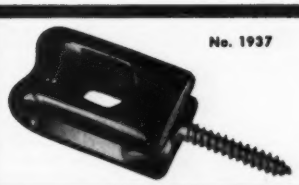
SUSPENSION TYPE INSULATORS

Dead End	No. 1261, 6″ dia.
Ball and Socket	No. 1253, 10″ dia.
Clevis Type	No. 1270, 7½″ dia.
	No. 1271, 10″ dia.

REINFORCED WIREHOLDER INSULATORS

Reinforced Type	No. 1937 2¼″ Screw
Reinforced Type	No. 1937-3 3″ Screw

No. 1937



No. 101

SPOOL TYPE INSULATORS

Secondary Rack	No. 101, 1¾″ dia. Groove
Secondary Rack	No. 96, 3″ dia. Groove
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No. 502

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No. 502, No. 534, No. 536, No. 538, No. 540 — Use dependent upon strength and cable requirements

No. 175

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One Piece Pin Type
No. 135 No. 175 No. 253
No. 261 No. 266

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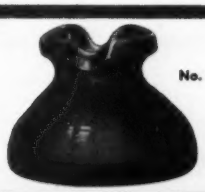
No. 261



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PGE MAY BUILD SECOND DAM ON DESCHUTES

Portland General Electric Co. has petitioned FPC for a preliminary permit to study feasibility of building a second dam on the Deschutes River in central Oregon. The project would add 225,000 kw to the Northwest Power Pool.

Site would be eight miles upstream from that of the proposed Pelton Dam, which has been opposed by commercial and sports fishing interests. Licensing of the Pelton project has been recommended by staff counsel for FPC, but the Oregon hydroelectric and state fish and game commissions have rejected an application for a state permit.

The new project, known as Round Butte Dam, would cost an estimated $37 million, bringing cost of the combined projects to some $60 million. Combined generation of the two plants would be 345,000 kw. The two dams together would be the largest nonfederal development in the Northwest. One larger, City of Tacoma's proposed dam on the Cowlitz River in southwestern Washington, has been turned down by the FPC.

James H. Polhemus, PGE president, said if the commission grants a license for Pelton, it will open the door to progress on Round Butte without raising any additional serious opposition from fishing interests. Company attorneys believe that, if the company receives a federal permit, it could go ahead with construction regardless of state opposition, because the proposed developments are entirely on public lands.

If the project materializes, PGE will consider constructing a transmission line from the area direct into Portland.

Exact physical specifications must await a $150,000 exploratory job, President Polhemus said, but present estimated height is 285 ft.

Tacoma City Light is Expanding System

Completion of a $1,200,000 receiving station this winter for Tacoma City Light will mark the first step in an $8 million program for expanding the city's power distribution system. A second $2,400,000 unit is due for completion in 1952-53, with the entire program, on the basis of present load estimates, to be fully developed by 1960.

Power from the Bonneville Power Administration and two city dams presently enters Tacoma on 110,000-v lines terminating at distribution centers.

First phase of the new station will include six 110,000-v line terminals, transformers and other equipment. It will relieve strain on other city equipment that last winter reached a point where it was 20% overloaded.

USBR Asks for New Bids On Eklutna Hydro Tunnel

USBR has rejected bids received June 25 for construction of the Eklutna hydroelectric tunnel in Alaska and invited new proposals under two schedules rather than the original one.

The first schedule will call for a low-level tunnel identical to that advertised earlier while the second will be for a high-level tunnel. If a contract is awarded on Schedule 2, bids will be called at a later date for a dam to raise the level of Lake Eklutna. Less excavation would be required under Schedule 2.

The low bid at the first opening exceeded $20 million, almost doubling the estimate.

Water Development To Be Discussed at Hearings

Under auspices of the Columbia Basin Interagency Committee, a series of public hearings to discuss the committee's $3½ billion plan for water development in the Pacific Northwest will be held this fall at Spokane, Boise and Portland.

Purpose of the hearings, announced by Committee Chairman Brig. Gen. O. E. Walsh, North Pacific division engineer, Corps of Engineers, is to determine public reaction to the committee's development plan before it is presented to Congress. The provisional plan calls for expenditure of $570.7 million a year over a period of six years, with the federal government paying a total of about $3¼ billion, and five Northwest states providing the balance.

Representatives of the Corps of Engineers, Bureau of Reclamation, Department of Agriculture and various state agencies will be represented at the hearings with a view to framing a program that can be presented to Congress with the unified support of all groups.

Plans for the hearings were approved at a recent meeting at Portland, attended by three Northwest governors, Douglas McKay of Oregon, Arthur Langlie of Washington and Len Jordan of Idaho.

Above: Wireless telegraphy apparatus employed by Guglielmo Marconi in 1899. Right: 150-ft aerial mast at his Boulogne, France, experimental station.

Rendezvous With MASTERY

1899—and a young man, near Boulogne, France, presses the key of a transmitter. Instantly, his message clicks out on a receiver in Dover, England—32 miles distant. The way has been opened to mastery of instantaneous, world-wide communication.

1899—and a Board of Directors of an infant firm, convening for its initial meeting in Newark, N. J., hears the Treasurer state that $1,400 is at the disposal of Driver-Harris Company with which to commence business. The way has been opened to mastery of new facts and techniques which will provide industry with quality metal products never before available.

"Wireless" has been developed with phenomenal speed since the day Marconi's message was successfully transmitted from Boulogne. Within fifty years—as radio, television, and radar—it has been made to circle and serve the world.

And Driver-Harris, expanding within the same fifty years until represented on all five continents, has produced many of the alloys required. For example: Gridnic* for electron tube grid wire, alloys for radio cathode sleeves and glass seal metals, Karma* and D-H Manganin for resistors, and universally famous Nichrome* and Nichrome V for resistors, plates and other components.

Today, Driver-Harris' specialized knowledge and extensive facilities are employed in supplying superior alloys for a host of applications in numerous fields. The name "Driver-Harris", indeed, has become so widely accepted as a synonym for quality that the demand for D-H products is engaging the resources of the firm to an unprecedented extent. Driver-Harris can only say it is utilizing all the mastery at its command to meet this exceptional demand as fully as possible.

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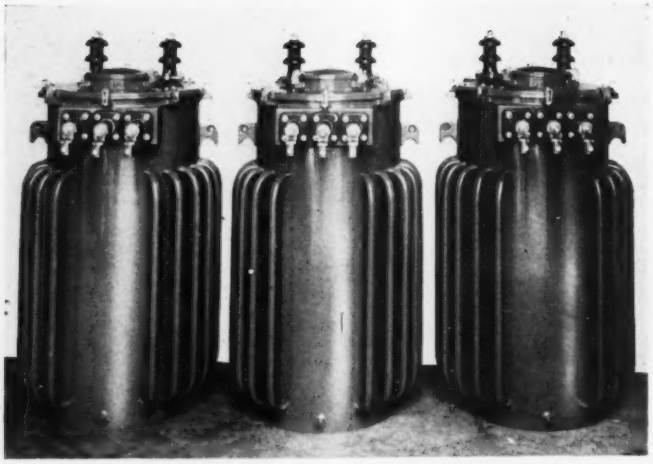

These three Gardner Transformers (75 KVA, 14,400 to 240/480 volts) recently traveled to a large Public Utility Company in Amarillo, Texas.

TRAVEL IS BROADENING

Wherever you go in the Western States, you naturally expect to find Gardner Transformers. But that's not all. Go West, go South, go North, go East — to the Orient, South America, Alaska, Texas or to South Dakota — and you'll find Gardner Transformers operating economically and efficiently under all kinds of climatic conditions. Gardners go where there are important power jobs to do.

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MANUFACTURERS

If your company and your Western Sales outlets are not listed in our 1951 Manufacturers Directory — make certain they are sent to us for our file so they will appear in the 1952 Directory.

STUDIES COMPLETED FOR THE DALLES DAM

Model studies of the proposed The Dalles Dam on the Columbia River have been prepared by North Pacific division, Corps of Engineers, at its Bonneville hydraulic laboratory. Preliminary planning is in anticipation of a Congressional appropriation already authorized.

The Dalles Dam, fifth in the series of Columbia River dams in the federal program, will be located at the head of Bonneville pool, 192 miles above the mouth of the Columbia and about three miles east of The Dalles, Ore. It will consist of a navigation lock, spillway, power house, and non-overflow dam sections, totaling about 7,800 ft in length. The navigation lock, located on the Washington shore, will be 86x675 ft in clear plan dimensions and will provide a 15-ft depth of water over the 5-ft drawdown. The gate-controlled spillway, crest elevation 119, will be 1,848 ft long.

Plans for initial power development include 14 units rated at 78,000 kw each. Ultimate installation of 22 units is contemplated.

Fish ladders and power house collecting systems similar to those at Bonneville Dam and those designed for McNary Dam are proposed. Downstream migrants would have access both to fish ladders and fingerling by-passes. Cost of salmon hatchery facilities is included in the project estimates.

Construction cost of the project, with 14 generating units installed, is estimated by the Corps of Engineers at about $350 million.

Completion of The Dalles development would bring total generation from five federal projects on the Columbia (not including projects on tributary streams) up to about 5.7 million kw. Already in production are Grand Coulee and Bonneville, and under construction are McNary and Chief Joseph.

● **A nation-wide** underwriting group headed jointly by Lehman Brothers, Union Securities, Bear Stearns & Co., and Dean Witter & Co., is offering 541,464 shares of Pacific Power & Light Co. common stock at $14.25 a share. Of these shares 250,000 comprise new financing. Common stockholders of record July 23 had until Aug. 18 to subscribe to the new stock in the ratio of one additional share for each seven shares held. Proceeds from the new financing will be used to improve and expand facilities.

REORGANIZATION STARTED ON SALT RIVER POWER DISTRICT

Reorganization of the Salt River Project Agricultural Improvement and Power District has been started at Phoenix, Ariz.

Richard D. Searles, U. S. undersecretary of interior, resigned as president and member of the board and was succeeded by W. W. Pickrell. Other board members are John Pendergast, Tolleson, and Clyde Neely, Gilbert. A vote of the association membership will be conducted Oct. 3 to expand the board to nine members.

The power district is the mother organization of the Salt River Valley Water Users Assn. It was organized in 1937 as a municipal corporation to facilitate financing. In 1949 it took over all of the power operations.

The district operates a chain of four hydroelectric plants on the Salt River, a steam-diesel generating plant at Tempe, and is constructing a 30,000-kw steam plant at Kyrene south of Tempe at a cost of $4,500,000.

Army Lets Contracts for Alaska Power Plants

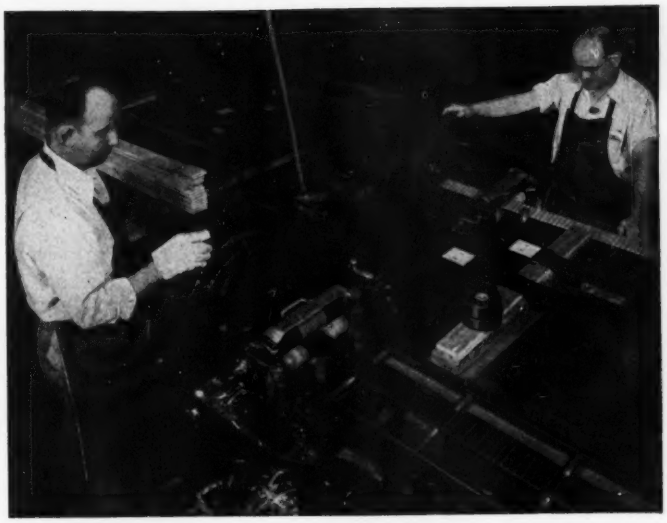
Contract has been awarded for one power plant in Alaska while the only bid received by the Corps of Engineers for a second plant has been rejected.

Morrison-Knudsen Co. Inc., of Boise, Idaho, will build a 9,500-kw power and heating plant for the Alaska Railroad and Chugach Electric Cooperative Assn. at Anchorage for $2,763,000.

Only bid for a six-boiler, five-turbine plant at Whittier was in the amount of $5,827,000, approximately 57% above the government estimate.

● **Southern California Edison** Co. has filed a request with the California Public Utilities Commission for authority to offer at competitive bidding $30,000,000 in first and refunding mortgage bonds due in 1976. Proceeds from the bond sale would be used by the company in financing its continuing construction program. Edison has also filed a registration statement covering the proposed bond issue with the Securities and Exchange Commission.

● **Portland General Electric** Co. plans to spend $2,300,000 to expand its power plant on the Willamette River at Oregon Ctiy from 5,000 to 15,000 kw. Power was first generated at Willamette Falls in 1888 to light the streets of Portland, 14 miles away.



On UL labeled outdoor Bus Ducts . . .

Bus bars protected with plastic tape!

Ventilated "LO-X" of BullDog Electric Products Company won the first UL label for outdoor use of Bus Duct. Bus bars are wrapped with "SCOTCH" Electrical Tape No. 22.*

Bus bars of Weatherproof "LO-X" Duct are wrapped in "SCOTCH" Electrical Tape No. 22. Previous insulating material was difficult to handle and apply. New tape is mechanically wrapped on straight lengths up to 10 feet—gives excellent appearance and first class performance.

When *you* need insulation that resists moisture, alkalies, acids and oils try this tough new plastic-backed tape. Dielectric strength is over 10,000 volts, yet this sleek, super-thin tape is only .010 inch thick. Stretches snugly around odd shapes. Stick-at-a-touch adhesive gives moisture-tight seal—keeps weather out, prevents corrosion.

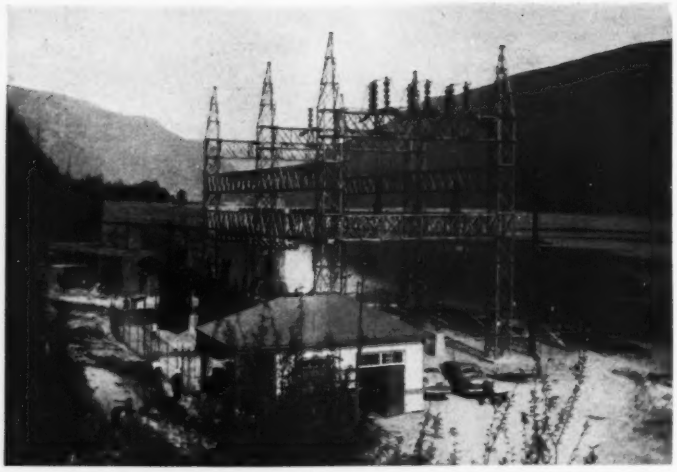
Order "SCOTCH" Electrical Tape No. 22 today from your wholesaler. Or write Minnesota Mining & Mfg. Co., Dept. EP-951, St. Paul 6, Minn., for booklet giving you all the facts.

*Refers specifically to Underwriters' Laboratories listed busway of Bulldog Electric Products Co. having bus bars wrapped with a tape insulation that is highly resistant to dampness and moisture.

Quick Facts about "SCOTCH" Electrical Tape No. 22

- **TOUGH**— plastic backing is abrasion-resistant, unaffected by water, oil, acids, alkalies, sunlight.
- **STRETCHY**— conforms to any surface.
- **HIGH DIELECTRIC**— over 10,000 volts.
- **DEPENDABLE**— won't dry out.

The term "Scotch" and the plaid design are registered trade-marks for the more than 100 pressure-sensitive adhesive tapes made in U.S.A. by **MINNESOTA MINING & MFG. CO.**, St. Paul 6, Minn.—also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: Minn. Mining & Mfg. Co., International Division, 270 Park Avenue, New York 17, N. Y. In Canada: Minnesota Mining & Mfg. of Canada, Ltd., London, Canada.



Power from the B. C. Power Commission's 33,000-hp Whatshan development is flowing into north Okanagan and Kamloops areas. Initial step in an ultimate 66,000-hp program, Whatshan Dam and power plant are located two miles north of Needles and 90 miles from Vernon, B. C. The power house, shown here, includes two 16,500-hp units. Development ties in with a hydro stand-by plant at Shuswap and a coal-steam plant at Kamloops. The obsolete Barriere plant, which formerly served the district, will be dismantled

Rate Increase Approved for B. C. Electric Co.

Application of British Columbia Electric Co. to charge 25,000 industrial and commercial customers an average of 15% more for power has been approved by B. C. Public Utilities Commission.

The interim boost, effective Aug. 1, covers those customers in Vancouver, Fraser Valley and Vancouver Island who were untouched by the March increase for residential and small power users. Public hearings will be held in the fall on both increases.

Commission officials said experts had substantiated company claims that taxes and costs had increased to a point where an increase was required.

Highway Plans Suspended Pending Libby Dam Study

Proposals for the 200,000-kw Libby Dam power project have brought about suspension of work on the 200-mile Big Bend portion of the Trans-Canada Highway in British Columbia.

Works Minister E. C. Carson said that no further work will be done on the road while plans are in the air for the project. Go-ahead on the hydro scheme would force abandonment of a large portion of the highway, and an entirely new route would be required between Golden and Revelstoke.

Building of Libby Dam will back up waters of the Columbia River north of Revelstoke, flooding some 17,000 acres and inundating parts of the present highway.

British Columbia has been asking a share in the hydro output from Libby as compensation for flooding of lands, and the question is reportedly far from settled yet.

● **Grant County PUD,** with headquarters at Ephrata, Wash., has established a district office at Moses Lake to service 3,500 accounts, as compared to 511 the PUD had there in 1945. Ed A. Tull is the manager of the office.

● **Application** of the Eastern Oregon Electric Cooperative for a loan of $330,000 to improve its system has been approved by REA. The money will be used to build 85 miles of distribution line to serve 74 new rural customers in Umatilla County, Ore. When completed, the co-op will have 205 miles of transmission line serving 394 customers.

● **The Corps of Engineers** shaved $150,000 from the original bid for construction of Big Cliff Dam and completion of the Detroit power house; let the contract to Consolidated Builders Inc. of Mill City, Ore., for $7,252,947. The development is scheduled to go on the line by the summer of 1953.

RESULTS OF HEAT PUMP STUDY ARE RELEASED

Heat pumps are not generally feasible for house heating in the Puget Sound area around Seattle, Prof. George S. Smith of the University of Washington Electrical Engineering Department has concluded after an investigation sponsored jointly by the University Experiment Station and the Bonneville Power Administration.

One factor that limits any widespread use of heat pumps, Smith said, is that the average city lot is too small. The heat extracted from the ground in winter must be restored by the sun's rays each summer, if the heat pump is to continue functioning. The ground area not covered by the dwelling just isn't large enough to permit this restoration in the average case, the investigation shows.

Puget Sound soils, usually clay or peaty, are poor conductors of heat, it was discovered.

A homeowner with a well or an underground spring on his property would find the heat pump "a very economical means of heating after the first cost of installation has been cared for," Smith said. Lake or stream water is less satisfactory as a source of heat but can be used if winter temperatures of the water do not drop below 36 F.

Utility Sells Downtown Steam Heating Plant

Puget Sound Power & Light Co. has sold its downtown steam heating plant in Seattle to a group of business men for $400,000, subject to working out conditions of transfer.

The purchasers are Charles Clise, Frank Dupar, C. H. Gordon, Walter Wyckoff and Andrew Steers, owners of buildings the heating plant has been serving.

The plant originally cost more than $2.5 million and has been carried on the power company's books at a valuation of $1.5 million. It was appraised recently by engineers for the city at $1.25 million.

The power company's steam heating franchise expires March 14.

● **Pacific Power & Light** Co. has installed a network analyzer developed by its own engineers. The instrument is used to simulate system faults and to study power flow. It embodies a number of features not found in commercially manufactured boards. Into its complicated makeup went some 27,000 ft of wire, 2,000 plugs and jacks, 1,000 terminal blocks and 405 DT switches. It has 400 circuits.

Here's Why You Get Extra Service with VICTOR TRANSMISSION PINTYPES

VICTOR Transmission Pintypes give extra long life because they're designed for severe service and made to rigid specifications. Each is thoroughly inspected at every point of manufacture. Performance data *proves* they furnish years of trouble-free service! Choose VICTOR—the finest insulators skilled craftsmen and modern methods can produce!

V UNEQUALLED STRENGTH! VICTOR'S de-airing process produces porcelain of maximum density, strength and resistance to impact.

V CUSHION COATED JOINTS absorb thermal variations and mechanical shock.

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VICTOR carries a complete line of transmission and distribution line hardware. These high quality products include aluminum, forged steel and malleable iron strain and suspension clamps as well as arcing horns, yoke sets and other allied fittings.

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FLUORESCENT STARTERS

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REFLECTS THE CRAFTSMANS SKILL

This is a glow switch condenserless precision starter equipped with automatic thermal relay circuit breaker. The relay automatically removes the lamp from the circuit electrically when the lamp becomes deactivated and automatically resets upon interruption of the lamp circuit.

SIMPLIFIES—Replacement of defective lamp automatically recycles starter circuit. No buttons to push—no replacement of starter.

REDUCES COST—Magno-Tronic starters provide exact timing of electrode heating, preventing excessive loss of emission material, thus assuring maximum possible lamp life.

VERSATILE—Built to operate efficiently over an extended voltage and temperature range.

SP-15-20 For use with 15 or 20 watt lamps.

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Favorite of our Full Line!

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NEW CLOUD-SEEDING TECHNIQUE REPORTED

A technique for seeding target cloud areas said to require a hundredth the amount of silver iodide previously thought necessary and to preclude the danger of flooding distant areas has been announced by North American Weather Consultants.

The technique cannot produce precipitation at a distance of more than 50 miles from the apparatus, according to Robert D. Elliott, former Cal-Tech meteorologist and an organizer of the firm. An advantage of using a smaller number of iodide crystals is that it is not necessary to start operations 50 to 100 miles upwind of the area needing rain, he said.

Elliott reported that he had supervised cloud seeding operations in the San Diego area that brought a 60% increase in precipitation using one one-hundredth of the usual amount of silver iodide.

Students Completing Summer Scholarships with Utility

Nine electrical engineering students at Oregon State College have used the summer vacation to gain practical experience in the electric utility industry. The students have been given summer job scholarships by Portland General Electric Co., and are working at diversified tasks.

The job-scholarship plan is a permanent company activity, designed to stimulate student interest in utility careers. Close contact is maintained with each student engineer for possible employment after graduation.

● **Central Arizona Light & Power Co.** has placed in operation a $100,000 supervisory control system at Phoenix. Centralization of the dispatching system will permit one man to open and close all circuit breakers in substations around Phoenix. The system is engineered to indicate how much power each generator is putting out and the total amount of power coming into Calapco from the Salt River Power District and the Bureau of Reclamation.

● **Pacific Power & Light Co.** is building a 115-kv line to carry power from the Yale hydro development. The circuit will run 12 miles downstream to tie into the company's transmission system at Merwin Dam. During construction, the line will take power from Merwin to the Yale site.

NEWS ABOUT PEOPLE

● **Election** of **W. C. McWhinney** as vice-president of Southern California Edison Co. was announced by President W. C. Mullendore. McWhinney will head the public relations department. Starting in the electric utility business in California in 1909, he had been assistant vice-president in the public relations department since 1936 and at one time was commercial manager. The change in the department will permit **Lane D. Webber,** vice-president, to devote full time to the company's affairs at a national level and to other special assignments.

● **Harold M. Clapper** succeeds **Elbert Kramer** as WESCO branch appliance sales promotion manager for southern California, it was announced by M. B. Sauer, manager of the Vernon branch. Capper joined WESCO in 1945 as a trainee after serving in the Navy as radar technician. Kramer has been made radio and television sales promotion manager for Westinghouse Supply.

● **Robert P. Burrows,** formerly with G-E Lamp division on the Pacific Coast, has retired as assistant manager of advertising for the division. A 36-year veteran with G-E, Burrows prior to going to Nela Park in 1934 was for five years manager of the division's Pacific sales district with headquarters in San Francisco. He plans to make his home in southern California.

● **Ralph B. Hubbard,** manager, Rocky Mountain Electrical League, Denver, was elected vice-president of the Intermountain Association of Electrical Leagues. He will also continue as treasurer of IAEL. The organization will hold its annual meeting Oct. 11-13, in New Orleans.

● **J. E. Anderson,** assistant treasurer, Puget Sound Power & Light Co., was elected a director of Controllers Institute and heads local controllers' group in his own area.

● **David G. Taylor,** vice-president of Gardner Electric Mfg. Co., Emeryville, Calif., has been named to the power transformer and distribution transformer industry advisory committee, National Production Authority.

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DRY TYPE TRANSFORMERS
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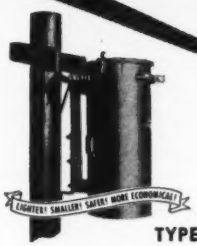

TYPE ACO
All purpose, indoor or outdoor, dry type distribution transformers. Sizes to 100 KVA, voltages to 5000 V.

TYPE C
General purpose transformers, 600 volts and below; 1-15 KVA inclusive, single or three phase completely self contained.

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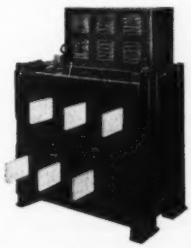

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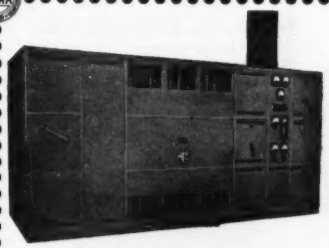
3 PHASE, 3/2 PHASE, 1 PHASE
Uses—Forging, heat treating, melting, resistance heating, welding, etc.



TYPE F - UNIT SUBSTATION
1000 KVA, 4160Y 60 Cycles, 3 Ø —480 delta; Fused, load interrupter on H.V. (left). Drawout type breakers and metering equipment on L.V.

ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DRY TYPE TRANSFORMERS EXCLUSIVELY

1 to 2,000 KVA up to 15,000 Volts to meet Individual Requirements

- DISTRIBUTION
- GENERAL PURPOSE
- UNIT SUBSTATION
- PHASE CHANGING
- ELECTRIC FURNACE
- RECTIFIER
- WELDING
- MOTOR STARTING
- SPECIAL

MTC produces a complete line of quality transformers to 2000 KVA. A newly expanded plant with the most modern equipment, plus a background of years of dry type specialization, assures maximum transformer value.

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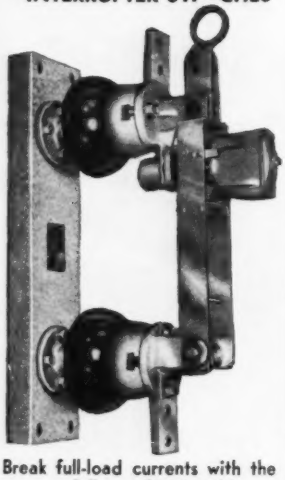
INC.
40 MONTGOMERY STREET
HILLSIDE 5, NEW JERSEY

PIONEERS IN THE FIELD OF AIR-COOLED TRANSFORMERS

S & C "ALDUTI" INTERRUPTER SWITCHES



Break full-load currents with the arc fully confined within the interrupting unit.

Single-pole or three-pole operation, indoor or outdoor service.

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And all types of mica combination for your electrical requirements—sheet, tubes, and fabricated parts.

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SEATTLE 4
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DENVER 2
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● Edgar **L. Buttner,** Oakland, Calif., electrical contractor, has been appointed a member of the Contractors License Board to succeed **Roy M. Butcher,** San Jose, Calif., whose term expired. Buttner's term will end Jan. 15, 1954. The appointment was made by Governor Warren of California. Buttner, a veteran of World War I, is past president of the East Bay Electric Club, a director of the Northern California Electric Bureau and a member of the National Electrical Contractors Assn. He will serve on the Contractors License Board as the representative of electrical contractors.

● **Alvien Henn,** senior power dispatcher, and **John R. King,** associate electrical engineer and staff assistant to the superintendent, have retired from their positions with Seattle City Light. Henn joined the utility in 1926 as an operator at the Gorge power house, King in 1934 as an order clerk. King will continue as treasurer of the Northwest Public Power Assn.

● **Waldo Porter,** chief electrical engineer at the Vancouver, Wash., plant of the Aluminum Co. of America, has been elected chairman of the Portland Section of the American Institute of Electrical Engineers. Other new officers of the section are J. D. Franz, Pacific Power & Light Co., vice-chairman, and W. C. Meyer, Westinghouse Electric, secretary-treasurer.

● **Donald O. Wells** of Oakland received one of the four teen-age $2,000 scholarships, awarded each year to sons of Westinghouse employees, to apply toward a college education in engineering or the physical sciences. He is the son of **Otis H. Wells,** electric service supervisor for the engineering and service division at San Francisco.

● **J. L. Singleton,** vice-president in charge of the general machinery division of Allis-Chalmers Mfg. Co. and at one time with that company in Denver, has been elected to the board of directors.

● **Jim Arnaud,** formerly associated with the Keeler-White Co. in Seattle, is now connected with Union Insulating Co. as assistant sales manager. He has been transferred to the home office in Parkersburg, W. Va.

● **C. Theodore Caesar,** 62, since 1935 credit supervisor of the Puget Sound Power & Light Co.'s Southern division at Olympia, Wash., died July 8. He joined the company as a collector at Tacoma in 1925.

Traugott

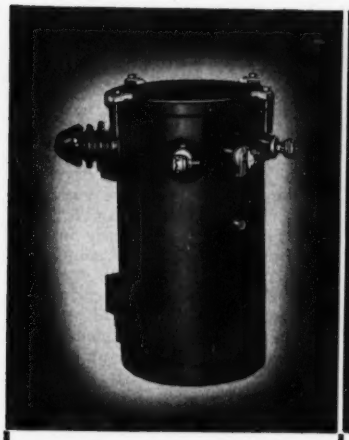
● **Theodore E. Traugott** has been appointed regional manager for the Locke department of General Electric Co. at San Francisco. He is being transferred from Minneapolis, where he has been district manager for four years, to open the San Francisco office.

Wensberg

● **R. H. Wensberg** has returned to Seattle to resume management of the Bozell & Jacobs office he founded there in 1945. For the past 16 months he has been executive vice-president of the New York office of the advertising and public relations agency, which handles the Electric Company Public Information program. **Vincent R. Fowler,** who has been vice-president in charge of the Seattle office, has gone to New York as secretary-treasurer.

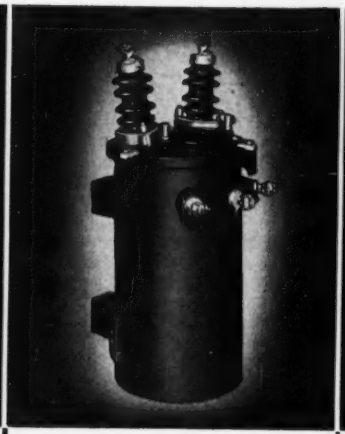
● **James C. Barney,** assistant manager for John A. Roebling's Sons in Los Angeles since 1947, has been appointed assistant manager of sales for the wire rope division and transferred to Trenton, N. J.

MOLONEY DISTRIBUTION TRANSFORMERS ...for *DEPENDABILITY and PERFORMANCE*



CONVENTIONAL TYPE LL

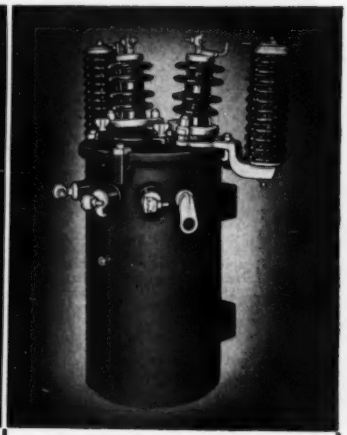
The Type LL Transformer is provided with sidewall-mounted high voltage and low voltage bushings for use on system voltages of 5000 volts or below. These transformers are manufactured in standard Kva ratings from 3 to 100 Kva. Porcelain protective caps are regularly supplied on the high voltage terminals of Type LL Transformers to protect the lineman from accidental contact with the live terminals.



CONVENTIONAL TYPE CL-2

The Type CL-2 Transformer is provided with two cover-mounted high voltage bushings. These transformers are standard in sizes 167 to 500 Kva in all voltages and in sizes 3 to 500 Kva in voltages above 5000 volts.

Transformers with a single cover-mounted high voltage bushing, designated as Type CL-1, are designed for use on grounded neutral systems. One end of the high voltage winding on this type transformer is grounded to the tank internally.



COMPLETELY SELF-PROTECTED

Completely Self-Protected Transformers are equipped with lightning arresters, internal protective links, tank grounding gaps, and secondary circuit breakers. These transformers are available in standard ratings up to 100 Kva and voltages up to 15000 volts. High voltage bushings are sidewall-mounted for voltages of 5000 volts and below and are cover-mounted for voltages above 5000 volts.

The Moloney Electric Company has a transformer to meet the requirements of any distribution system. Recognition of the fact that continuity of service is a "must" on these systems has always been a guide to Moloney engineers in the design of distribution transformers.

Conventional Distribution Transformers are available for those customers who prefer to supply their own protective equipment. For those who prefer integrally mounted protective equipment, there is available a complete line of CSP (Completely Self-Protected) Transformers. Superior electrical performance is assured in all Moloney transformers as a result of liberal design and quality control.

ME51-11

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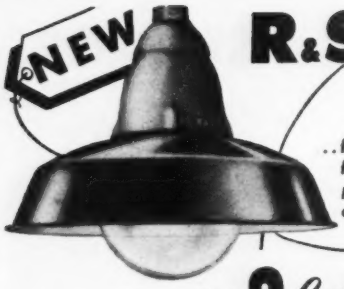
Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control Transformers • Step Voltage Regulators • Unit Substations

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS, MO. AND TORONTO, ONT., CANADA



NEW **R&S** DUST-TIGHT LIGHTING FIXTURES

..for hazardous locations where flammable or explosive dusts are present. Class II, Groups E, F, G and Class III.

With 2 Exclusive Design Features

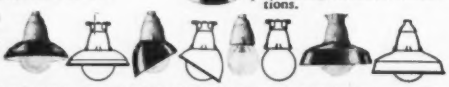
1 Lampholders are located within the conduit box assembly of both pendent and junction box types, permitting installation and wiring without regard to size or style of fixture.

2 All fixture – globe – Reflector assemblies fit either base and are easily attached or interchanged by means of a simple bayonet slot and screw arrangement, without disturbing electrical connections.

R & S Type DI Lighting Fixtures contribute outstanding advances in fixture construction and installation simplicity! They operate very cool – 'way below allowable temperatures for this type of installation.

Two *exclusive* design features, in addition to basic advantages common to other well-constructed dust-tight fixtures, assure faster, easier installation, cleaning and relamping. They're made of cast aluminum alloy – designed with streamlined simplicity – and shaped to prevent dangerous accumulation of dust particles. Write for Information Data Sheet No. 7151-10.

Pendent and Junction Box bases standard to all fixtures. They accommodate any fixture – globe – reflector assembly in 100 or 200 watt sizes.



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NOW...a PENGO Auger size to meet your needs exactly...

A scientifically-designed double-helix auger that:

★ Bores in any kind of soil, hardpan or decomposed rock, frozen ground, permafrost.

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"THE MOST PROFITABLE TOOL YOU EVER BOUGHT". Order PENGOS for your present machines... specify PENGO augers with your new machine.

ORDER TODAY...SEND FOR LITERATURE, PRICES

PETERSEN ENGINEERING CO.

Santa Clara, California

(Former address, San Francisco)

● **General Electric** Co. has placed the electrical distribution section at the Hanford Works near Richland, Wash., in a new department called Utilities and General Services, with **F. E. Baker** as manager. **F. J. Mollerus** heads the section and **O. Magechon** is area engineer. **H. A. Carlberg,** plant electrical engineer, and **J. A. Todd,** plant power engineer, now report to **H. D. Middell,** manager of plant engineering, on the staff of the manufacturing department, headed by **C. N. Gross.**

● **L. J. Bourke** has been appointed assistant to the executive vice-president, Puget Sound Power & Light Co., Seattle. He previously was supervisor in the general commercial department, starting with the company as a student engineer in 1923. He also has served as local manager, secretary to the vice-president, assistant to the vice-president, division manager and depreciation engineer for the company.

● **Charles F. Terrell,** former vice-president of Puget Sound Power & Light Co., has been appointed general manager in Greece for Ebasco Services Inc. Ebasco has a contract with the Greek government to supervise construction of a modern power system to manage its operation until expiration of the contract in 1955.

● **Ward Storrar,** formerly local manager at the Snoqualmie, Wash., office of the Puget Sound Power & Light Co., has been appointed assistant superintendent at the Snoqualmie Falls power plant to replace **Joe Martin,** who resigned. The new Snoqualmie manager is **John McLean,** most recently assistant chief clerk in the company's Central Division at Seattle.

● **S. D. Andrews,** who has been with General Controls Co. in San Francisco for three years, has been transferred to the manufacturer's Dallas, Tex., office as branch manager. **Henry B. Safford Jr.** has been made advertising and sale promotion manager of the company, with offices at the Glendale headquarters.

● **Edward H. Heister** has been named local manager of the Port Orchard office of Puget Sound Power & Light Co. Heister replaces **Harry E. Dingle,** who had been with the company more than 38 years. He joined the company as a meter reader 16 years ago, most recently has been supervisor in the general office commercial department.

ALL KINDS
of SMALL
TRANSFORMERS

—in the JEFFRIES line

Practically all your small transformer needs are supplied by the Complete Jeffries line. We have specialized for years in providing transformer to exactly match your requirements. If not in our regular line, we build to meet your specifications in a hurry!

Minimize your voltage losses. Specify scattered transformers to eliminate duplicate conduit runs, and save on power costs.

JEFFRIES TRANSFORMER COMPANY
1710 E. 57th St. Los Angeles 11, Calif.

ALL the strength and durability inherent in steel are combined—with definite economies—in *Crapo* Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.

Ask the distributor of *Crapo* Galvanized Products near you or write direct for further information!

INDIANA STEEL & WIRE CO.
MUNCIE INDIANA

NOTES ON THE TRADE

● **Pacific Electric Mfg. Co.** moved into the first completed section of its new $650,000 Santa Clara plant in August. The new plant will supplement the existing San Francisco plant. It will contain 58,500 sq ft of floor space including a two-story engineering and office building, on a 21-acre site that gives ample room for further expansion. Personnel from the leased San Jose plant have been transferred to the Santa Clara facility which will be devoted to the manufacture of air switches. Oil circuit breakers will continue to be made in the San Francisco plant.

● **Mullenbach Electrical Mfg. Co.** of Los Angeles has leased a 15,480-sq ft plant at 2248 E. 37th St. in that city. This additional space will be used for manufacturing the products of the specialty transformer division. The main plant at 2300 E. 27th St. will be devoted entirely to products of the switchboard and panelboard and the industrial control divisions. General offices and sales offices for all divisions will remain at the main plant.

● **Sierra Electric & Mfg. Co.** of Los Angeles has acquired McDonald Mfg. Co., plastics and electrical manufacturer, according to **Lee T. Bordner,** Sierra president. **J. C. Prior** has been made vice-president in charge of production and engineering and **F. W. Walters** is now sales manager.

● **Wiancko Engineering Co.,** makers of electronic equipment, will build a 22,000-ft concrete tilt-up office and factory at Pasadena. Estimated cost is $176,000.

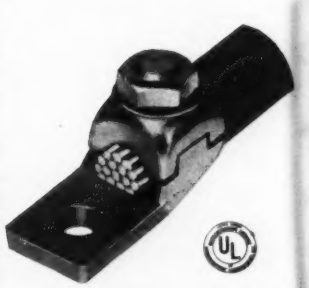
● **Public relations** offices of the Western district of United States Steel Corporation Subsidiaries have been moved from the Russ Bldg. to 25 Beale St., suite 643, San Francisco. **Charles W. Huse** is director of the department, **Harry J. Williams Jr.,** assistant director.

● **Mell O. Haldeman Corp.** of Los Angeles is now distributor in southern California for the A. O. Smith Permaglas and Duraclad water heater. **George Souther** is sales manager for Haldeman, which will handle the line in both the Los Angeles and San Diego areas.

BURNDY

quick like a

bunny



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CONNECTORS

Rugged, compact terminal for indoor and outdoor. Installed with ordinary wrench. No separate parts. Height constant regardless of cable size connected. Unlimited variations offered — any combination of clamping elements, any tongue shape or drilling. See your Burndy Distributor.

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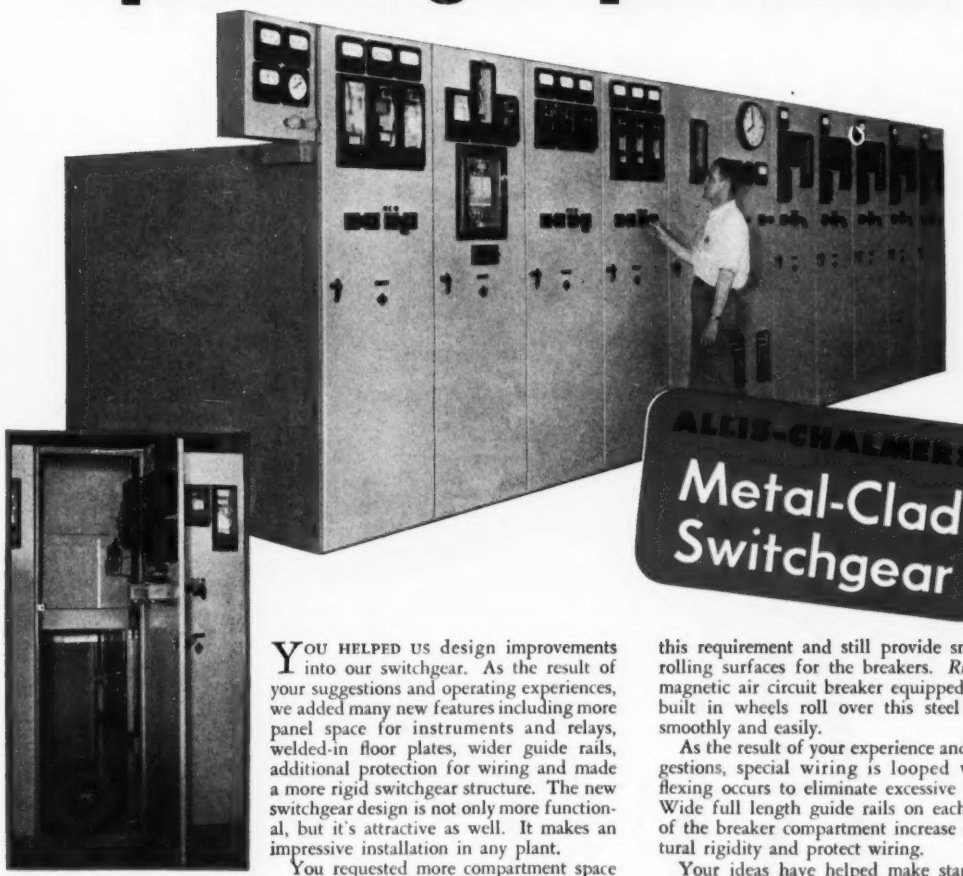
PROFILES

Chewelah (Wash.) Mayor A. W. Birge, left, receives a $45,562 check from J. E. E. Royer, Washington Water Power Co. vice-president and general manager, for farm lines formerly operated by Chewelah City Light. Physical transfer of 26 miles of line was completed after Chewelah voters had approved the sale four to one in a special election held last June. Formerly the city bought power at wholesale from Washington Water Power to serve the farms, and in 1949 renewed a WWP contract instead of accepting an offer from Bonneville Power Administration. Royer said that a 10% saving in rates would be effected and that service improvements would be made. New voltage regulator equipment is on order. A short section of tie line has been built and submetering installed

Training of lighting consultants is something So. Calif. Edison believes in and it goes on constantly. Here Henry Rice, sales manager, meets with consultants H. H. Wilson, Huntington Park, group leader; A. E. Ashcraft, Long Beach; R. A. Cowie, Redlands; R. E. Coultas, Ventura; and Roy E. Dahlin, director of lighting development

Longview and Kelso meeting of Oregon-Columbia Chapter, NECA, in Jack Keel's store, Kelso, brought out material shortage problems. Left to right: Keith Lebacken; Joe Krivanek Jr., chairman of local division; Stan Adams, Electric Construction Co., Portland; Leon Hampton; Larry Rodgers, chapter manager; Jack Keel; Wes R. Grasle, Portland, chapter president; Louis Scharf; P. H. Bullock; Joe Krivanek Sr. of Longview

Better Because of Your Operating Experience



Welded-in floor plates provide a smooth rolling surface for your circuit breaker. Guide rails placed at each side of the breaker compartment add rigidity to the structure. A-3385

Ruptair is an Allis-Chalmers trademark.

YOU HELPED US design improvements into our switchgear. As the result of your suggestions and operating experiences, we added many new features including more panel space for instruments and relays, welded-in floor plates, wider guide rails, additional protection for wiring and made a more rigid switchgear structure. The new switchgear design is not only more functional, but it's attractive as well. It makes an impressive installation in any plant.

You requested more compartment space for mounting auxiliary equipment. So we designed a new and more spacious compartment for mounting power transformers, transfer bus and similar equipment. It permits you to make a variety of circuit arrangements in a single standard breaker unit.

You wanted to avoid special plant floors for the installation of switchgear. We designed welded-in floor plates to eliminate this requirement and still provide smooth rolling surfaces for the breakers. *Ruptair* magnetic air circuit breaker equipped with built in wheels roll over this steel floor smoothly and easily.

As the result of your experience and suggestions, special wiring is looped where flexing occurs to eliminate excessive wear. Wide full length guide rails on each side of the breaker compartment increase structural rigidity and protect wiring.

Your ideas have helped make standard Allis-Chalmers switchgear safer, stronger and better built. It's modernized to do a better protection job for you.

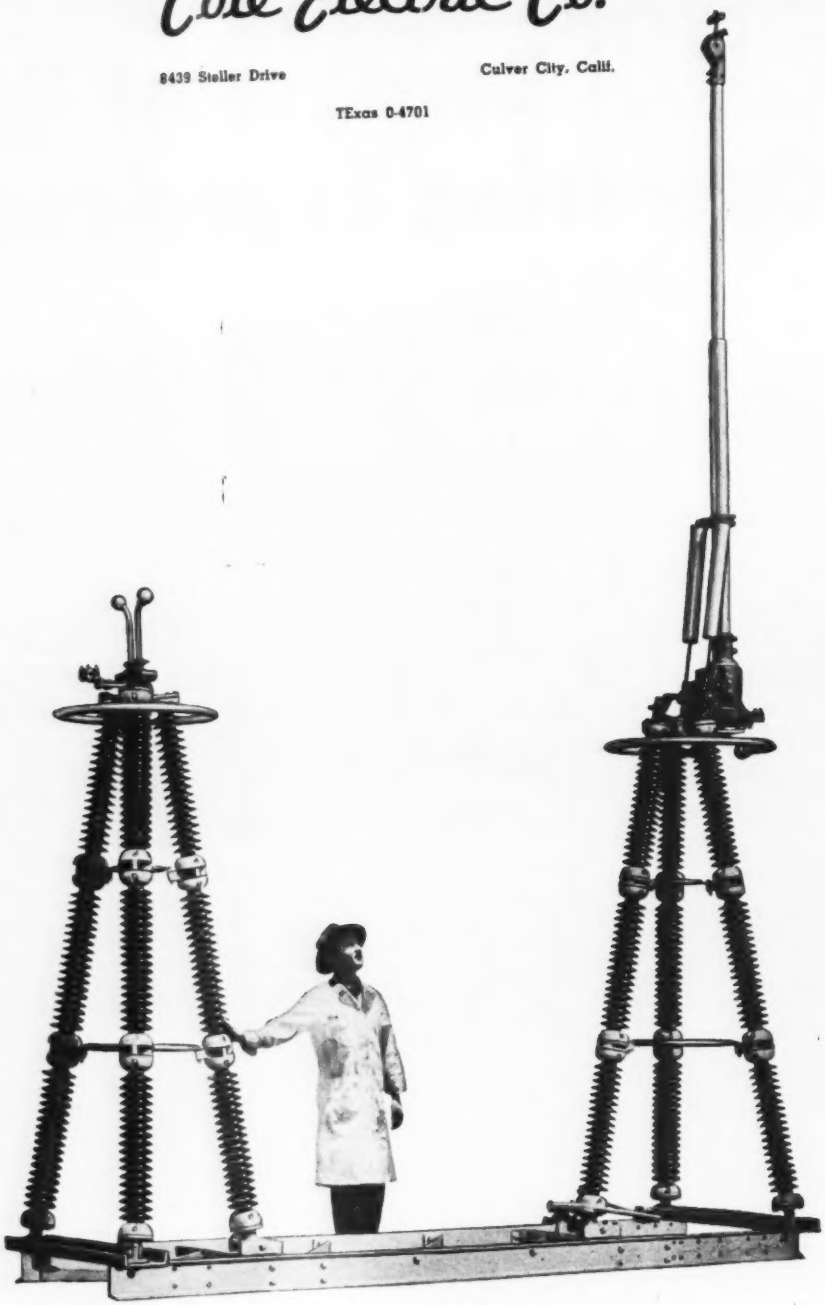
Standard Allis-Chalmers switchgear is composed of matched units, yet it can be tailor-made to suit your requirements. Get the facts today from your local Allis-Chalmers sales office. Or write direct to Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS A-C ALLIS-CHALMERS **First in the U. S. with Metal-Clad Switchgear**

Cole Electric Co.

8439 Steller Drive Culver City, Calif.

TExas 0-4701



AIR BREAK DISCONNECTING SWITCH
230,000 Volts—1200 Amperes—Type MO-2
Vertical Break—Three Pole, Single Throw
Group Operated
(One pole shown)

"Good lighting...an excellent investment..."

—writes R. O. Curtola, El Curtola Restaurant, Oakland

"Good lighting, we believe, has been a most important factor in establishing El Curtola as a favorite downtown eating place," states its owner, "and we are convinced that well planned lighting is an excellent investment for any business."

Planned lighting pays for itself faster than you might have imagined . . . whether your business is marketing, manufacturing or service. We'll be glad to show you case histories from businesses similar to your own.

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Whatever your business

Good Lighting Is a Good Investment

Increases production, sales

Reduces waste

Keeps employees happy, efficient

Reduces accidents

Increases cleanliness

For a survey of your lighting and ideas on how better lighting can help you, call the lighting engineer at your P. G. and E. office, or consult your contractor or engineer.

ONE OF A SERIES OF ADS TELLING HOW YOU CAN MAKE YOUR P.C.E.A. MEMBERSHIP PAY DIVIDENDS

Ever want to slug Joe?

Write for your FREE copy of this new booklet explaining where you can take part in P.C.E.A. activities.

While you probably wouldn't actually slug old Joe, you do wish you could hit hard at his doctrine of duplicity, barbarism and enslavement. How to do it?

Active participation in P.C.E.A. activities is one good way. Our greatest defense against the spread of collectivism and communism is a strong free-enterprise economy. And P.C.E.A. is dedicated to those activities which strengthen our industry through constant research, technical progress and market development.

By helping each other, exchanging ideas and working together we have brought more and better electric service to more people at lower cost. Much remains to be done, however. And if you take part in the P.C.E.A. you can help keep our industry strong, while frustrating the human termites who are trying to bring about our collapse.

PACIFIC COAST ELECTRICAL ASSOCIATION

601 WEST FIFTH STREET, LOS ANGELES 17 — 447 SUTTER STREET, SAN FRANCISCO 8